

BAND III.

DIE FUNKENSPEKTREN DER ELEMENTE.

DIE
SPEKTREN DER ELEMENTE
BEI NORMALEM DRUCK

von

PROF. FRANZ EXNER UND DR. EDUARD HASCHEK

ZUGLEICH II. WESENTLICH VERMEHRTE AUFLAGE
DER WELLENLÄNGENTABELLEN FÜR SPEKTRAL-
ANALYTISCHE UNTERSUCHUNGEN

BAND III

LEIPZIG UND WIEN
FRANZ DEUTICKE
1912

Verlags-Nr. 1910.

Die Anordnung der Tabellen der Funkenspektren ist ganz analog jener der Bogenspektren im zweiten Bande. In bezug auf die Eliminierung der Verunreinigungen sowie auf die bei jedem Elemente gemachten Literatur- und sonstigen Angaben gilt das dort Gesagte. Nur die Zeichenerklärung sei hier nochmals wiederholt.

- ⊕ bedeutet unscharf,
- d " doppelt,
- u " umgekehrt,
- br " breit,
- r " verwaschen nach Rot,
- v " verwaschen nach Violett,
- () " daß eine Linie des eingeklammerten Elements über die gemessene fällt,
- L " Luft.
- K. R. " Kante einer Bilde, die nach Rot,
- K. V. " Kante einer Bilde, die nach Violett abschattiert ist.

Da in den Funkenspektren regelmäßig auch die Linien der Luft auftreten, so haben wir zur Bequemlichkeit bei analytischen Untersuchungen das Luftspektrum als ein Ganzes den übrigen Tabellen vorausgestellt, während sich die Spektren von Sauerstoff und Stickstoff gesondert in den Tabellen finden.

Luft.

Ältere Messungen: O. Neovius, Bihang. Svensk. Vet. Ak. Handl. 17, 1 (1891). J. M. Eder und E. Valenta, Sitzber. der K. Akad. der Wiss. Wien 118, IIa. (1909). A. Kretzer, Zeitschr. für wiss. Phot. 8 (1910). W. Schwetz, Zeitschr. für wiss. Phot. 8 (1910).

2318.71	1 + 0	3845.27	1 + N	4114.20	1 + 0
2418.70	1 + 0	48.18	1 + 0	16.65	1 + N
33.63	1 + 0	50.65	1 + N	19.46	8 + 0
45.55	1 + 0	51.50	1 + 0	20.62	3 + 0
2522.30	1 + 0	57.2	1 + N	21.73	2 + 0
3007.42	2 + 0	61.83	1 + N	24.27	2 + 0
3135.3	1 + 0	63.70	1 + 0	29.60	1 + 0
39.45	1 + 0	64.74	1 + 0	33.02	2 + 0
3265.41	1 + 0	82.47	3 + 0	33.85	2 + N
3320.80	1 + 0	93.43	1 + N	42.36	1 + 0
25.1	1 + 0	3907.73	1 + 0	43.89	1 + 0
29.55	2 + N	09.29	1 + N	46.03	4 + N
31.89	2 + N	12.20	3 + 0	52.21	1 + N
54.20	1 + 0	19.24	10 + N	53.56	4 + 0
66.0	1 + N	40.20	3 + N	56.83	1 + 0
67.43	1 + N	45.25	3 + 0	69.49	2 + 0
74.2	1 + N	47.55	1 + 0	72.0	1 + 0
77.33	1 + 0	54.55	4 + 0	76.16	3 + N
90.43	2 + 0	56.04	6 + N	79.80	1 + N
3408.39	1 + 0	73.44	8 + 0	85.72	6 + 0
3743	3 + N	82.90	2 + 0	90.06	8 + 0
71.08	1 + N? 0?	95.26	50 + N	96.20	1 + N
3545.23	1 + N? 0?	4014.1	1 + 0	99.2	1 + N
60.43	1 + N? 0?	25.77	3 + N	4206.80	2 + N
89.2	1 + N? 0?	35.07	4 + N	11.5	1 + N
94.60	1 + N? 0?	41.48	5 + N	22.5	1 + N
3709.45	1 + 0	56.5	1 + N	23.35	1 + N
12.95	2 + 0	63.70	1 + N	28.56	3 + N
27.47	4 + 0	70.04	10 + 0	36.93	5 + N
29.41	1 + N	72.40	10 + 0	41.94	5 + N
44.4	1 + N? 0?	76.08	10 + 0	53.74	1 + 0
49.66	5 + 0	79.11	2 + 0	66.45	1 + N
54.82	1 + 0	81.70	1 + N	76.0	1 + N
58.41	1 + N	85.36	3 + 0	82.43	1 + N? 0?
60.00	1 + 0	89.23	2 + 0	4303.74	1 + 0
71.09	1 + N	93.15	3 + 0	17.27	3 + 0
3804.23	1 + 0	97.43	3 + N	19.78	3 + 0
24.23	1 + 0	4103.46	3 + N	25.85	1 + 0
30.82	2 + N	05.15	5 + 0	27.61	1 + 0
39.30	3 + N	11.06	2 + 0	28.70	1 + 0
43.12	1 + N	12.26	2 + 0	31.23	1 + 0

433210	1	- N	462157	4	- N	498758	1	- br, N
3701	2	- O	3073	15	- N	914	1	- N
4571	3	- O	3420	1	- N	9160	1	- N
4758	2	- O	3899	2	- O	500154	3	- N
4814	2	- N	4070	1	- N	0530	3	- N
4957	6	- O	4194	3	- O	0750	2	- N
5154	3	- O	4327	5	- N	1079	1	- N
6180	1	- N	4926	5	- N	165	1	br, N
6704	3	- O	5100	2	- O	258	1	br, N
6948	1	- O	5478	1	- N	4528	2	- N
717	1	br, N	6176	2	- O	517606	1	br, N? O?
7975	1	- N	751	1	- N	7963	1	- N
925	1	- N	7634	2	- O	52508	1	- N
9614	2	- O	9775	1	br, N	543235	1	br, N
440133	1	- N	9933	2	- O	5238	1	br, N
1507	8	- O	470540	1	- N	5441	1	br, N
1714	5	- O	0557	2	- O	8028	1	br, N
2608	2	- N	103	1	- O	9590	2	br, N
3030	1	- N	1858	1	- N	552633	1	- N
3262	2	br, N	2690	1	br, N	3030	2	- N
344	1	- N	3578	1	br, N	3540	2	- N
4329	1	- O	514	1	br, O	5207	1	br, N
4723	20	- N	6490	1	br, N	665	1	- N
5257	2	- O	744	1	br, N	566678	10	- N
6025	1	- N	7995	2	- N	7645	5	- N
6554	2	- O	8142	1	br, N	7970	20	- N
6806	2	- O	8830	3	- N	8640	5	- N
6955	1	- O	9390	2	- N	571089	2	- N
7795	1	- N	480333	5	- N	307	1	br, N
450778	2	- N	0608	1	- N	4747	1	br, N
1495	1	- N	1038	1	br, N	6760	1	br, N
3008	2	- N	4785	1	br, N	592805	3	br, N
4488	1	- N	799	1	- N	3205	5	br, N
5265	1	- N	9553	1	- N	407	2	br, N? O?
9113	3	- O	490705	1	- O	419	10	br, N
9631	3	- O	2481	1	br, O	526	1	- N
460167	5	- N	4128	1	br, N? O?	61707	1	br, N? O?
0734	4	- N	4316	1	br, O	648228	2	- N
0973	1	- O	545	2	br, O	661068	1	br, N
1405	3	- N						

I. Ad. Aldebaranium.

Ältere Messungen: C. Auer von Welsbach, Sitzber. der K. Akad. der Wiss. Wien, Bd. 116, Abt. II b. (1907).

Material: Aldebaraniumnitrat aus Oxid von C. Auer von Welsbach, auf Gaskohle.

Verunreinigungen: Cp, Tm.

Linienzahl: 795.

2224.58	1	2683.50	1	2767.63	1	2842.32	1 + Cr ?
40.14	2	84.84	2	71.45	3	42.69	1
57.09	1	88.05	1 +	72.70	1 + Cp	43.11	2
62.39	1	91.06	3	74.47	1 +	43.9	1 + br
65.75	1	92.10	1	76.40	4	44.95	1 +
83.08	2	92.70	1	79.45	1	47.32	3 +
2305.41	3	95.54	1 +	80.00	1 +	47.60	2 + Cp
09.39	2	96.70	1 +	83.85	1	48.55	3
14.58	2	2700.88	1	84.80	3	49.44	2
38.07	1	01.80	1 + Cp	88.44	2	51.23	10
2567.75	5	04.05	1	89.60	1	51.95	2
79.70	3	08.95	1 +	93.40	2	53.51	2
96.25	1	09.80	1	94.55	2 +	53.79	1
96.40	1	10.65	3 d?	94.91	1	54.21	3
97.38	1 +	11.89	1	95.24	1	54.59	2 Y?
99.28	1 +	12.43	3	96.73	1 + Cp	58.50	3
2603.40	1 + Cp	12.73	2	97.35	1 Tm	59.50	4
15.49	2 Cp	18.43	3	99.48	1	59.90	6
17.10	1 +	19.10	1	2800.12	3	60.51	2
21.24	3	19.53	1 + Tm	03.55	15	61.34	4
27.16	1 +	22.29	1	04.36	1	61.44	4
38.20	2	32.80	3	08.40	1	65.44	1
39.53	1 +	34.20	1	08.69	1 +	66.30	1
40.61	1 +	41.82	2	10.85	1	67.19	5
42.03	1 +	47.69	1 +	14.35	1 +	69.31	2 Tm ?
42.64	8	48.75	4	14.64	2	70.17	2
44.42	2	50.07	3	16.45	1	71.85	1
46.55	1 +	50.60	10	17.09	5	73.53	1
49.89	1 +	51.55	3	18.89	15	76.01	2
51.82	5	53.42	2	21.25	4	79.27	2
52.32	5	55.05	1	23.68	2	82.03	2
53.83	10	55.86	3	24.30	1	82.24	1
56.20	1 +	56.1	1 + br	25.10	3	86.07	2
60.10	1	56.94	1 +	28.03	1	86.39	3
65.12	3	59.12	2	31.10	5	88.15	4
66.20	8	59.67	1	31.67	1	91.50	20
67.09	8	60.89	2	32.31	1	93.75	3
68.85	1	61.50	2	35.10	2	95.05	2 + d, Cp
72.73	4	64.50	2	38.75	1	97.02	3
77.46	3	65.67	1	41.44	1	98.49	3

2899.39	1 +	2962.64	4	3019.15	1	3088.94	1 +
99.85	3	63.39	3	19.58	1	89.21	5
2900.41	1 Cp	63.57	4	22.57	2	90.90	1 +
02.55	1	64.54	2	23.74	1	92.64	5
03.06	2	64.89	3	25.05	1 +	93.54	1
06.50	5	66.00	1 Tm	26.78	15	93.99	4
06.98	1	66.90	3	28.50	1	95.00	1
08.22	2	69.94	1 Cp	29.69	10	95.35	1 + d
08.44	2	70.70	4	31.24	5	97.00	1 +
09.30	2	70.98	3	33.97	1	98.70	1
09.60	3	72.65	1	34.75	3	3101.48	4
11.61	8 Cp	75.70	1	36.94	2	02.17	3
12.45	1	77.65	1	38.11	2	08.00	30 r, u
14.35	10	79.03	1	38.64	1	09.90	1 +
15.38	3	79.80	1 +	39.80	4	13.08	1 +
16.56	2	79.99	1	42.78	5	13.50	1 +
19.49	15	81.60	1	44.14	2	14.86	1
21.23	3	82.17	1	44.95	2	15.42	8
24.34	3	82.62	3	46.60	3	16.15	2
25.76	1 Tm	82.71	2	47.18	3	16.56	2
26.80	1d(Tm)	83.80	3 +	50.86	1 Tm	16.75	3
27.99	2	84.09	5	54.13	1 +	17.90	10
29.14	2	84.95	2 +	55.29	1	19.77	1 +
33.16	1	85.14	3	56.20	1 Tm	22.29	1
35.22	3	85.95	2	56.87	1 + Cp	22.63	1
36.10	1 Tm	86.10	1	58.04	1 Cp	23.60	1
37.28	2	88.01	1 +	63.24	3	24.03	1
38.29	1	89.30	1	63.80	3	25.02	1
38.60	1	89.88	1	64.35	1	25.55	1
39.44	1	90.47	3	65.13	10	26.20	10
39.62	2	91.99	4	68.39	2	27.23	1
40.61	3	94.04	3	68.80	1 +	27.94	2
42.13	2	94.90	8	71.71	2	29.20	2
42.90	1 +	95.94	3	73.20	2(Tm)	30.5	1 + br
44.53	2	98.11	3	73.60	1 +	31.38	3 Tm
46.02	10	98.45	1	73.79	2	32.73	2
46.40	3	3000.59	8	73.90	1 +	33.99	2 Tm
46.85	2	01.40	1	74.62	1 +	36.88	4
47.23	1 +	02.16	1	75.33	1 +	38.73	2
49.30	2	02.71	5	76.16	2	41.02	10
50.42	2	05.85	20	77.30	1 +	41.84	4
51.15	1	06.95	1 Ca?	77.71	3 Cp	45.19	5
51.50	1 +	09.51	8	78.52	1 +	45.68	1 +
51.86	1 +	10.72	5	80.66	1	46.25	1
53.15	1	13.78	1 + Tm	83.38	1	49.12	2
55.42	2	14.60	5	84.47	2	51.16	2 Tm
59.75	1	15.40	2	85.30	1	51.57	1
60.97	2	17.20	1 +	85.93	2	53.30	3
61.93	2	17.70	10	87.08	3	53.98	10

3155.33	3	3232.11	3	3305.80	4 r	3385.64	1
55.91	1	34.67	2	06.89	3	87.65	1
57.47	1 Tm	35.61	1 + Tm	08.11	1	90.45	1 + d
58.42	3	36.25	3	09.50	4	91.22	4
63.91	5	36.65	1	09.90	2	92.50	1 +
65.31	4	36.93	1 Tm	10.69	1	94.60	3
68.00	1	39.31	3 +	12.21	1	96.45	3
68.31	1 Tm	40.35	1 Tm	13.89	1 +	97.20	4 Cp
68.53	1	41.66	2 Tm	15.49	3	97.65	3
69.19	8	49.98	1 Tm	16.26	1	98.14	1
71.31	2	51.45	1	16.98	2	3400.09	1
72.94	2 Tm	51.76	1	18.40	1	01.10	3
73.91	3	53.05	1 +	19.27	10 d	02.40	1
75.86	3	53.6	1 + br	20.40	2	04.24	4
81.03	3	54.40	3	24.24	2	07.64	1
85.56	1 +	56.13	1 +	24.60	1 +	08.68	1 +
86.72	2	58.18	3	25.67	2	10.20	1 +
89.12	1 +	59.21	3	27.84	1 +	12.60	1 +
90.94	1	61.63	4	29.50	1 +	16.10	1
91.53	3	61.80	5	31.31	1	17.01	2
93.01	20	64.24	1	33.19	5	18.54	1
94.34	2	65.10	2 +	37.30	2	19.75	2 +
94.85	3	66.10	1 +	41.20	1	25.25	5
95.70	3	66.76	2	43.11	5	25.76	2
96.16	1	67.51	2	46.62	1	26.19	2
96.46	1	69.11	2 Tm	47.67	5	27.26	1
98.24	1 +	71.28	2 +	50.05	1	28.60	10
98.80	8	71.65	2 +	51.20	1 +	30.10	3
99.95	1	75.90	3	52.60	1	31.29	3
3201.30	10	76.94	1 Tm	53.85	1	36.59	4
02.68	1 +	78.3	1 + br	54.99	1 Tm	38.84	4
04.11	1	78.5	1 + br	56.00	2	38.97	4
04.81	2	79.12	1	57.10	2	40.25	3
06.30	2	81.89	1	59.74	1	41.14	2
07.84	1	83.52	2	61.33	1 d	41.65	3
10.26	4	84.80	1	61.70	1 +	44.01	1
10.67	1 Tm	85.75	2	62.63	1 +	44.78	1
13.51	1 +	87.08	2	62.80	4(Tm)	47.01	3
15.63	1	89.50	200	63.80	1	48.15	1 +
16.08	2	91.12	2	66.12	4	49.90	1
17.34	8	94.45	3	68.50	1	52.52	1
18.49	4	97.95	3	69.74	1	53.80	3
21.40	2	98.95	1 +	74.66	2	54.21	10
21.64	1	3301.60	1 + br	75.65	15	56.33	1
23.26	1	01.95	1 + br	76.70	1 +	58.39	8
26.00	5	02.56	3	78.58	1 +	59.33	1
26.89	1	04.68	3	79.90	5 +	60.38	2
28.76	5	04.88	3	82.68	1	62.31	4
29.95	1	05.35	1	84.20	3 +	64.45	5

3465'99	2	3557'30	1	3655'90	1	3750'30	1
67'19	3	57'91	1	61'05	1	51'92	1
70'03	2	58'64	1	61'75	3	52'35	1
70'90	2	60'49	3	61'92	2	53'20	1
72'60	3 Cp	60'89	5	65'97	1	54'02	1
74'97	3	62'80	2	66'80	1	55'60	1
75'57	2 (Fe)	64'10	3	67'45	1	56'42	1
76'44	4	66'05	2 Tm	68'26	2	57'00	2
78'99	20	66'64	2	69'89	5 r	59'30	1
81'89	1	67'29	3	70'84	4	61'10	2
85'89	4	67'99	1	73'30	1	61'47	4 Tm, Ti
87'7	1 -+ br	70'71	3	75'21	10	62'03	3 Tm
88'51	1	72'65	1	78'14	1	62'67	2
88'94	2	74'20	1	79'05	2	66'26	2
91'75	1 +	77'20	3	83'30	1	68'38	2
92'71	1	85'60	5 +	87'28	2	70'30	3
93'08	1	85'99	1 +	87'72	2 (Fe)	71'60	3
95'31	1	86'99	1	90'70	5	76'16	2
3502'30	2	90'50	2	91'60	3	77'23	1
03'80	1	93'53	1 +	94'35	200	78'92	2
06'74	2	96'64	1 +	98'75	8	79'42	2
07'51	3 Cp	99'35	1	99'93	2	81'80	2
07'98	4	3600'56	2	3700'40	3 Tm	82'70	5
12'79	1	00'92	3	01'50	4 Tm	83'69	2
13'20	1	04'01	2	03'52	3	84'01	2
16'00	3	06'62	4	04'99	2	84'53	1
18'30	3	07'55	1	08'82	2	85'50	2 r
20'42	10	08'64	1	09'36	1	87'31	3
29'20	1 +	09'69	1	10'44	4	90'10	2
31'39	1	10'36	3	12'0	1 + br	91'60	1 +
34'20	1	11'47	4	12'95	1	94'51	2
34'70	1	14'18	1 +	14'30	1	95'91	5
35'00	2	18'20	1	16'20	1	3802'93	1
35'65	3	19'99	8	18'04	3	06'34	2 +
36'33	2	21'12	2	20'60	1	07'71	3
36'70	2	24'16	1 +	21'10	2 +	15'02	2
39'50	1	24'78	2	22'41	5	16'38	4
42'53	1 +	30'05	2	24'33	5	18'38	1 +
43'30	1 +	32'73	2 +	25'20	2	18'84	1 +
44'25	1 +	34'70	1	28'80	1	30'54	1
45'06	1	37'94	5	29'22	1	33'20	2
45'89	1 +	43'81	2	29'91	2	34'73	1 +
48'60	1	44'41	2	30'52	3	35'50	1
49'05	1	47'41	1	34'25	4	36'68	3
49'98	5	48'65	1 +	41'22	2	45'06	2 +
52'46	2	49'93	1 +	44'19	3	48'13	8
52'86	1	50'98	1	44'79	1 +	57'25	1
53'70	1	53'17	1 +	46'15	1	58'00	1
54'59	4 Cp	53'80	2	49'85	3	64'64	2

3869.48	2	4040.25	2	4190.49	4	4481.48	
87.47	2	43.22	2 +	4200.12	1 + Tm	87.43	
90.65	1	47.55	1 +	03.90	2 Tm	94.20	
3900.94	2	50.30	1 +	18.75	5	4515.33	
04.93	4	52.49	1 +	28.07	1 +	18.75	
05.99	1	56.35	2 r	34.71	2 +	22.72	
11.43	1 +	77.43	4	42.31	3 Tm	53.79	
16.61	1	86.86	1	48.09	1 +	76.39	
34.45	1 +	89.83	1	52.70	5	82.53	
38.40	2	91.70	1 +	55.99	1	91.00	
38.66	2	94.37	3	57.82	2	98.53	
47.10	1 +	98.04	1 +	67.17	1 + (C)	4616.11	
49.26	1	4106.00	3	4306.15	1 +	83.99	
49.38	1	13.23	1 +	17.12	5	4713.00	
58.25	3	19.61	2	22.38	2	26.24	
73.43	3 +	23.00	1	39.24	1 +	86.82	
88.20	20	23.39	1	60.09	1 Tm	4820.47	
91.05	2	35.28	8	70.96	4	37.14	
95.72	1 +	49.23	1	86.60	1 Tm	4935.70	
96.67	2	52.46	1	89.92	1 +	37.45	
4001.03	1 +	70.23	4	93.00	1 +	5335.32	
19.51	1	81.01	5	4402.41	2	53.12	
28.42	2 +	84.40	2 + Cp	09.48	1	5556.64	
31.85	1	87.80	3	39.38	2	6489.35	

II. Ag. Silber.

Ältere Messungen: J. M. Eder und E. Valenta, Denkschr. der der Wiss. Wien, Bd. 63 (1896).

Material: Ultraviolet: Feinsilber aus der kaiserlichen Münze.

Sichtbar: Silbernitrat auf Gaskohle.

Verunreinigungen: Ca, Cu, Fe, Pb, Si.

Linienzahl: 380.

2106.77	1 +	2171.05	1 + br	2211.25	2	2246.50	
13.90	2 +	71.85	1	18.93	1 +	48.81	
20.51	2 +	73.64	1	19.75	2 +	50.33	
21.02	1 +	86.88	2	23.15	1	53.52	
25.54	1 +	91.97	1	26.25	2 +	57.48	
29.17	1 +	96.33	1	29.65	3 +	73.37	
45.75	2 +	97.27	1 +	33.80	1	74.23	
49.38	1	2202.18	2 +	38.47	2	75.39	
62.03	2	03.71	1 +	40.50	2 +	77.50	
66.13	1 +	04.50	1 +	41.42	1	80.10	
66.65	2	06.02	2 +	41.87	1 +	82.74	
69.73	1 +	08.58	2 +	43.6	1 + br	86.57	

2291.17	1	2445.64	1	2619.72	1 +	2943.75	1 +
96.15	2 +	46.42	5	20.90	1	57.6	1 +
2309.7	3 +	48.01	20	25.80	3+(Fe)	83.65	1 +
12.5	1 + br	50.49	1	28.70	4	86.5	1 +
14.8	1 + br	53.39	20	37.63	1	91.75	1 +
15.40	1 +	57.72	1 +	37.98	1	3013.06	1
17.13	8	60.40	10	43.67	1	28.45	1 +
18.60	2	61.36	1 +	56.94	10	81.1	1 +
20.37	10	62.34	10	57.88	1	96.7	1 + br
21.64	2 +	64.05	1 +	60.59	20	99.24	1
24.76	6	66.47	1 +	76.75	1 +	3102.96	1 +
25.20	6	69.67	3	81.48	15	14.8	1 + br
29.2	1 +	71.44	1 +	84.97	1 +	15.8	1 + br
31.48	10	73.00	3	88.49	2 +	18.05	1 +
32.37	2	73.92	20	2708.53	1	24.15	1 +
33.80	1 +	76.30	1 +	11.31	8	30.1	1 + br
39.25	2	76.83	1 +	12.17	30 r	30.8	1 + br
42.00	2	77.34	15	16.27	1	42.2	1 +
43.85	1 +	79.40	1 +	17.38	1 +	50.0	1 +
58.00	8	80.50	10	21.86	3	53.30	2 +
58.95	6 r	85.87	4	44.02	6	72.35	1 +
62.28	4	86.73	2 +	56.58	20	73.77	1 +
64.09	5	2504.20	6	67.64	50	74.3	1 + br
65.77	2 +	04.87	1	86.60	2 +	76.55	1 +
73.79	2	06.72	10	99.80	20	77.8	1 +
75.0	2 + br	07.39	2 +	2815.68	10	80.85	3
79.8	1 +	09.23	1	21.2	1 +	84.3	1 + br
80.2	1 +	21.28	1 +	23.97	1 +	85.25	1 +
83.25	2 +	30.6	1 +	27.3	1 +	86.1	1 +
86.40	2 +	32.8	1 +	29.3	1 +	87.95	1 +
86.91	2	35.39	10	34.52	1	92.0	1 +
90.66	5 +	37.92	1 +	37.87	1 +	93.7	1 +
93.06	2 +	39.47	1 +	44.1	1 +	98.35	1 +
95.76	3	53.52	2	49.6	1 +	3200.18	1 +
97.74	1	57.6	1 + br	52.7	1 +	02.00	2 +
2402.68	3 +	62.64	1	57.4	1 +	03.83	1 +
05.08	3 + r	63.02	5	62.3	1 +	07.50	1 +
09.09	1 +	64.50	5 +	70.85	1 +	08.38	1 +
10.20	2	67.28	2 +	73.73	10	10.2	1 +
11.49	15	75.8	1 + br	78.06	1	15.65	1 +
13.31	20	80.86	20	78.90	1	16.85	2 +
14.91	1	84.30	1 +	82.3	1 +	18.2	1 +
20.19	10	86.30	1	96.61	10	18.85	1 +
22.70	2 +	95.76	3 +	2902.20	10	21.6	1 +
28.29	3 +	98.6	1 +	17.05	1 +	23.63	3
29.73	20	2602.27	1	20.18	5 +	25.20	1 +
36.70	2	06.23	10 +	29.48	10	29.15	1 +
37.89	30	14.65	10 +	34.35	20	30.15	1 +
44.30	8	17.21	1 +	38.66	6	31.5	1 +

3233.25	1 +	3304.2	1 +	3389.95	1 +	3877
40.95	1 +	04.7	1 +	94.1	1 +	3984
41.38	1 +	07.35	1 +	97.65	1 +	20
45.10	4 +	08.70	1 +	3405.25	1 + Co?	37
46.0	1 +	12.82	2 +	21.8	1 +	43
47.37	1 +	15.5	1 + Ti?	29.6	1 +	49
49.3	1 +	16.45	1 +	45.63	1	51
50.05	1 +	18.35	1 +	51.10	1	81
51.4	1 +	21.90	1 + Ti?	67.9	1 +	85
52.92	2 +	23.0	1 +	69.39	1	4004
54.0	1 +	26.05	1 +	75.99	2	22
56.7	1 +	29.15	1 +	95.45	1	27
57.5	1 +	30.77	1 + Sn?	99.8	1 + br	36
58.7	1 +	32.02	2 +	3501.85	2 +	37
62.9	1 +	33.82	1 +	05.25	1 +	55
64.37	1 +	34.5	1 +	13.38	1 +	86
67.50	1	39.35	1 +	15.6	1 +	96
68.6	1 +	41.45	1 +	42.74	4 +	4212
69.95	1 +	43.34	1	47.3	1 +	4311
70.3	1 + br	44.85	1 +	68.3	1 +	85
76.20	1 +	47.65	1 +	96.31	1	4476
80.81	100 u	49.45	1 +	3612.73	1 +	4555
86.08	1 +	52.21	2 +	16.5	1 + br	4615
86.9	1 +	53.4	1 +	74.28	2 +	20
88.1	1 +	54.5	1 + Co?	82.64	1	20
89.30	2 +	61.20	1 +	83.49	5	68
92.6	1 +	61.9	1 +	90.9	1 + br	78
93.18	1 +	65.05	1 +	94.85	1 +	4874
94.43	1 +	67.03	1 +	3714.30	1 +	5209
95.70	1 +	71.8	1 +	40.3	1 + br	5401
97.87	1 +	72.65	1 +	63.25	1 + br	04
99.0	1 +	83.03	100 u	3810.7	1 + br	65
99.60	2 +	87.23	1 +	73.5	1 + br	71
3301.70	3 +	89.5	2 + br			

III. Al. Aluminium.

Ältere Messungen: C. Runge, Wied. Ann. 55 (1895) (von λ 1

A. Hemsalech Phil. Mag. 44 (1897) (Rot) A. de G

(1898) I. M. Eder und E. Valenta Sitzber. der k. Akad

II a (1909) (Rot).

Material: Käufliches chemisch reines Metall.

Verunreinigungen: Ca, Fe, Ga, Mg, Mn, Si, Ti.

Linienzahl: 115.

2263.50	1 +	2312.54	1 +	2315.05	1 +	2319
69.15	1 +	13.61	1 +	17.53	1 +	21

2367·18	2 +	3050·30	1 + Cr?	3587·05	100 + br	4400·4	1 + br
67·70	1 +	54·90	1	3601·98	30 +	48·4	1 + br
68·20	1 +	57·40	2	12·62	20 +	66·65	1 + br
69·36	2 +	64·55	1 +	3702·70	2 + br	80·0	5 + br
70·30	1 +	66·40	1 +	13·85	3 + br	4511·0	1 + br
72·11	3 +	82·30	10 r	40·4	1 +	13·00	5 + br
73·3	2 + br	92·89	15 r, d ¹⁾	72·25	1 +	29·7	10 + br
78·49	1	3138·9	1 +	75·20	1 +	65·0	1 + br
2433·62	1	3286·0	1 +	79·22	1	68·0	1 + br
59·8	1 + br	3301·98	1 +	81·4	1 + br	79·5	1 + br
75·1	1 + br	18·6	1 + br	82·40	1 +	90·0	1 + br
2568·11	3 r	36·2	1 + br	85·50	1 +	4663·55	5 +
75·22	3 r	3492·05	1 + br	88·8	1 + br	67·4	1 + br
75·52	1 r	3503·7	1 + br	91·92	1	73·0	1 + br
2631·83	4 +	05·1	1 + br, Ti?	3804·23	1	4701·5	1 + br
38·2	1 + br	27·33	1 +	10·16	1	03·2	1 + br
52·60	2	34·4	1 + br	3900·83	2	5696·71	10 +
60·50	3	35·7	1 + br	44·22	50 r	5722·80	5 +
69·23	1	39·3	1 + br	61·74	100	6234·0	1 + br
2816·41	20	61·9	1 + br	4371·0	1 +	45·3	2 + br
2927·9	1 + br	64·0	1 + br				

Kanten.

4470·73	K. R.	4648·42	K. R.	4842·40	K. R.	5143·15	K. R.
94·26	K. R.	72·21	K. R.	66·55	K. R.	5357·9	K. R.
4516·60	K. R.	94·80	K. R.	5079·53	K. R.	77·6	K. R.
37·80	K. R.	4716·70	K. R.	5102·37	K. R.	94·6	K. R.
57·80	K. R.	36·10	K. R.	23·60	K. R.	5410·0	K. R.
76·60	K. R.						

IV. As: Arsen.

Ältere Messungen: J. Herpertz, Zeitschr. für wiss. Phot. 4 (1906).

Material: Metall von E. Merck, mit Ni legiert (40% As).

Verunreinigungen: Sb.

Linienzahl: 69.

2134·37	1	2271·53	1 +	2381·32	2 +	2831·0	1 + br
56·3	1 +	88·28	3 +	2437·30	1	43·80	2 +
65·53	2 +	2350·02	10	56·62	4	60·60	8
92·21	2 +	63·10	1 +	93·07	4	98·86	2
2229·96	1	69·75	3	2745·10	5	2926·3	1 + br
66·82	1 +	70·87	3	80·37	10	59·8	3 + br

¹⁾ Als Verunreinigung in Nb als Doppellinie gemessen zu 3092·82 i = 2 und 92·95 i = 1.

2991.2	1 +	4188.00	2	4428	1 + br	4888.8
3032.97	1	97.8	1 + br	32	1 + br	4985.6
3116.7	2 + br	4208.1	1 + br	50.4	1 + br	5023.4
19.70	1 +	29.5	1 + br	59.5	2 + br	30.4
3256.0	2 +	4305.6	1 + br	66.6	1 + br	5105.9
3545.75	1 +	15.9	1 + br	74.7	1 + br	08.1
3922.60	100	68.50	2 +	79.5	1 + br	5231.9
31.4	1 + br	70.2	1 + br	95.4	3 + br	5331.6
48.85	1 + br	81.1	1 + br	4539.9	1 + br	5498.0
4037.18	30	97.3	1 + br	51	1 + br	5558.28
64.55	1 +	4415	1 + br	4855	1 + br	5651.40
82.8	1 + br					

V. Au. Gold.

Ältere Messungen: J. M. Eder und E. Valenta, Denkschr. der d. Wiss. Wien 63 (1896).

Material: Metall von C. Schuchardt.

Verunreinigungen: Ag, Cu, Pd, Ca.

Linienzahl: 370.

2110.85	2 +	2260.52	1	2322.39	2	2404.91
25.4	2	61.45	1 +	24.79	1	05.23
57.29	1	62.82	2 +	25.37	1 +	16.70
84.19	1	63.88	2 +	25.82	1	19.40
89.00	2	66.10	1 +	32.01	1 +	28.05
2201.45	3	77.55	1 +	34.2	1 + br	33.0
05.97	1	77.75	2 +	40.29	3 +	33.6
10.75	1	79.50	1 +	44.35	1 +	35.45
13.26	2	83.01	2	47.21	1	42.42
15.82	2 +	83.42	3	51.66	1	45.63
19.3	1 +	87.75	1 +	52.75	3	46.23
20.59	1	88.32	1	55.60	1	58.25
22.6	1 +	88.70	1	64.66	2	76.12
29.05	3 +	91.60	3 r	65.00	2 +	77.85
31.40	2 +	94.00	1 +	68.05	1 +	80.38
33.80	1 +	95.23	1	69.45	2 +	86.64
37.55	1 +	96.66	1	71.68	2 +	87.30
40.40	1 +	2301.15	1 +	73.26	1 +	90.45
42.80	3	04.90	4 +	76.32	2	91.6
45.61	1	08.32	1	82.50	1	92.71
46.52	1 +	09.52	2 +	84.26	1 +	98.93
46.73	2 +	11.06	1	87.86	3	2503.39
48.74	1 +	12.35	1 +	88.27	1	06.43
49.13	1 +	14.75	3 +	88.47	1 +	10.63
53.53	1	15.93	2 +	93.64	1	15.19
55.07	1 +	18.45	1 +	2401.63	1	28.20
56.01	1	20.37	1	02.82	1	33.78

¹⁾ Rote Komponente stärker.

2538·13	1 +	2833·75	1 +	3211·15	1	3609·75	1
44·34	2 r	35·56	1	22·15	1 +	14·20	3 + br
50·31	1 +	36·03	1	28·13	1	20·0	1 + br
51·99	1	38·14	5 +	30·79	3 +	20·5	1 + br
52·90	1 +	47·20	2 +	42·83	1	22·8	1 + br
62·70	1 +	52·65	1 +	43·50	1 +	23·6	1 + br
65·81	2	57·00	2 +	67·2	1 + br	23·9	1 + br
83·7	1 + br	64·65	1 +	70·3	1 + br	25·3	1 + br
90·19	2 r	83·56	3	73·83	1	27·4	1 + br
92·20	1	85·69	2	86·2	1 + br	32·7	1 + br
2602·15	1 + br	92·06	2 +	3308·46	2	33·40	4
09·59	1	93·52	2 +	10·04	1	35·28	2 +
10·3	1 + br, Mn?	2906·04	3 + r	18·7	1 +	37·5	1 + br
12·8	1 + br	07·18	4	20·35	1 +	42·5	1 + br
16·65	2 +	13·63	10	23·3	1 + Rh?	43·0	1 + br
17·54	1	18·51	2 +	24·9	1 +	49·3	2 + br
25·62	2	29·92	1	49·60	1 +	50·90	1 +
27·14	2	32·30	4 +	55·32	1	53·7	1 + br
28·14	1 Bi?	54·55	4 +	58·5	1 + br	54·2	1 + br
35·1	1 + br, Ba?	63·9	1 + br	61·38	1 Ti?	54·9	1 + br
41·60	4	82·23	2	73·02	1 +	75·0	1 + br
46·98	1 + Pt?	90·40	5	82·1	1 + br	81·6	1 + br
59·53	1	95·12	5 + r	93·7	1 + br	83·0	1 + br
65·23	1	98·06	1 Pt?	3404·05	1	86·15	1 + br
67·05	1	3014·3	1 + br	04·73	1	90·3	1 + br
76·04	20 d?	15·94	2	52·4	1 +	95·8	1 + br
87·72	3	29·30	5	70·45	1 +	98·6	1 + br
88·25	3	33·3	2 + br	93·10	1	3702·5	1 + br
88·80	3	64·81	1 Pt?	3517·05	1	07·0	2 + br
94·4	1 + br	66·85	1	23·50	1	08·2	1 +
2700·99	3	91·4	1 + br	28·2	1 + br	52·9	1 + br
02·50	1 Pt?	93·4	1 + br	39·2	1 + br	65·0	1 + br
03·46	1	3102·8	1 + br	41·7	1 + br	65·70	1
05·97	1	04·0	1 + br	48·2	1 + br	70·1	1 + br
32·10	2 + br	06·80	1	49·3	1 + br	73·30	1
33·05	1	17·0	1 + br	50·7	1 + br	80·1	1 + br
48·36	8	19·7	1 + br	51·1	1 + br	96·05	1 + br
48·9	1 + br	22·62	5	51·69	1	3804·14	6
51·10	1 +	22·92	8	53·71	3 +	16·4	1 + br
80·94	3	27·1	1 + br	55·60	1 +	22·1	2 + br
94·32	1 + Pt?	31·05	1 + br	57·3	1 + br	23·1	1 + br
95·65	1	33·15	1 + br	66·1	1 +	25·9	2 + br
2802·31	20	39·05	1	86·85	5 +	29·5	1 + br
05·42	2 +	45·65	1	92·1	1 + br	31·3	1 + br
20·08	8 +	46·50	1 +	94·35	1 +	36·65	1 +
22·81	4 +	56·70	2	98·23	1 +	45·1	1 + br
25·56	4	65·0	1 + br	3601·23	1 +	47·58	1 +
30·37	1	94·82	2 +	05·0	1 + br	53·75	2 + br
33·16	2 Pb?	3204·87	2 +	07·7	1 + br	54·95	1 + br

3855·8	1 + br	3916·1	1 +	4128·8	1 + br	4588·05	2 + br
59·5	1 + br	27·8	1 +	72·93	1 +	4607·72	2 r
63·8	1 +	59·29	2	4222·00	1 +	33·2	1 + br
69·75	1	76·75	1 +	42·00	2 +	37·5	1 + br
71·47	1	79·70	1 +	60·13	1 +	4760·40	2
74·83	3 +	4012·75	1 + br	4315·30	5 r	91·78	1
77·40	1 +	16·20	5	95·6	1 + br	92·81	10 r
80·37	1 +	20·81	1 +	4410·4	1 + br	4811·78	2
83·48	1 +	28·63	1 +	20·81	2	4902·44	1
84·4	1 +	41·10	2	37·47	3 r	5064·80	1
89·60	1 +	52·98	6	88·43	5 r	5145·4	1 + br
98·05	10 r	61·2	1 + br	4549·7	1 + br	5230·46	2 r
3907·80	1 +	65·22	10	59·0	1 + br	5656·0	1 + br
09·54	2	76·49	2	82·2	1 + br	5837·64	1
14·4	1 +	83·42	1	83·9	1 + br	6278·40	1
14·9	1 +	84·29	2				

VI. Ba. Baryum.

Ältere Messungen: J. M. Eder und E. Valenta, Denkschr. d. K. Akad. der Wiss. in Wien 118, IIa. (1909) (Rot).

Material: Ultraviolet, Baryumnitrat auf Kohle. Sichtbar, Baryumbromid auf Kohle.

Verunreinigungen: Ca, Sr.

Linienzahl: 148.

2245·76	1 +	2634·96	10 r	3163·42	1 +	3649·38	1 +
54·89	2 +	41·55	1 +	95·31	1 +	62·7	1 + br
80·91	1 +	47·42	2 + r	3235·0	1 +	3889·52	2
2304·33	15 u	82·03	1	67·00	1 +	92·42	500 r
23·69	1	2702·7	1 + br	69·8	1 + br	3910·15	10 r
31·30	2	31·55	1 +	81·6	1 + br	26·98	2 +
35·39	20 u	46·2	1 + br	86·90	1 +	36·00	10 r
47·70	10	71·52	3 + r	3332·2	1 + br	38·11	2
73·22	1 +	2939·03	1 +	49·5	1 + br, Ti?	93·60	20
2418·20	1 +	60·10	1 +	68·32	3 +	95·85	2
76·92	1	62·58	1 +	69·85	1 +	4130·91	800 u ¹⁾
2505·26	1	3014·45	1 +	3501·26	5	66·29	100 r
10·3	1 +	43·48	1 +	25·3	1 + br	4224·15	1 +
20·24	1	71·75	3 +	45·0	1 + br	40·0	1 + br
24·00	1	79·20	2	77·77	1 +	42·9	2 + br
28·60	5 r	80·00	1 +	79·94	2 +	64·5	1 + br
31·15	1	3104·00	1 +	86·68	1 + Mn?	83·39	20 r
59·71	2	19·26	1	99·7	1 +	91·35	2 +
70·9	1 + br	52·76	1 +	3630·83	2 +	4305·45	1 +

¹⁾ Rote Komponente stärker.

4323·0	1 + br	4589·9	1 + br	4947·50	1 +	5826·52	10
25·38	1 +	92·0	1 + br	59·5	1 + br	54·00	100
32·8	1 + br	99·92	2	5055·0	1 + br	5907·88	2
50·70	5 + r	4605·1	1 + br	5160·15	1 + br	71·93	10
59·83	1 + Cr?	20·15	1 +	64·4	1 + br	97·38	10
4402·70	10	28·40	1 + br	75·8	1 + br	6019·74	10
07·03	1	73·76	2 +	77·4	1 + br	63·40	15
13·86	1 +	91·80	4	5267·15	1 + br	6111·10	20
32·03	8	4700·68	1 +	5303·2	1 + br	42·00	500 u
67·34	1 +	24·97	1 +	04·3	1 + br	6341·90	15
89·15	2 + br, v(Fe)	26·63	5	06·0	1 + br	6451·10	8
93·75	2 + br	74·1	1 + br	5424·81	3	83·19	10
4506·09	5	4846	1 + br	5519·30	10	97·20	200 u
23·42	2 +	66·7	1 + br	35·78	30	99·10	10
25·20	50 + r	67·7	1 + br	5680·5	1 + br	6527·59	10
54·21	1000 u	77·8	1 + br	5777·90	20	95·60	5
74·02	5	4900·19	100 r ¹⁾	5800·53	3	6675·56	2
79·79	10	34·31	300 u	05·93	2	94·12	2

VII. Be. Beryllium.

Ältere Messungen: Fehlen.

Material: Berylliumnitrat auf Kohle.

Verunreinigungen: Keine.

Linienzahl: 10.

2348·58	1	2650·71	8 u	3321·23	3	4572·87	5 r
48·72	3	3130·56	20 u	21·51	3	4673·1	1 + br
2494·75	6 u	31·20	15				

Kanten.

4708·89	K. R.
32·85	K. R.

VIII. Bi. Wismut.

Ältere Messungen: W. Schwetz, Zeitschr. für wiss. Phot. 8 (1910).

J. M. Eder und E. Valenta, Sitzber. der K. Akad. der Wiss. in Wien 118, II a. (1909) (Rot).

Material: Metall von C. Schuchardt.

Verunreinigungen: Ag, Ca, Cd, Cu, Pb, Sb, Sn.

Linienzahl: 121.

¹⁾ Daneben eine verwaschene Linie auf 4900·8?

2143.65	1 +	2696.98	5	3431.15	20 +	4308.40	3
44.58	1	2714	2 + br	51.20	20 +	08.74	3
87.05	2	30.53	3	55	1 + br	28.8	5 + br
2202.8	1 + br	30.71	4	74.0	5 + br	40.7	5 + br
14.15	1	46.45	1 +	85.7	5 + br	91.7	2 + br
28.30	3 u ¹⁾	80.68	8 r	3511.00	20	4477.3	2 + br
30.68	4 u	98.8	1 +	28.0	1 + br	92.80	1 +
46.53	1	2803.59	4	41.5	2 + br	93.15	1 +
65.11	3 (Cd)	03.80	5	96.35	20 r	4561.33	50
76.63	3 u	09.78	3 + -	3613.9	5 + br, r	4705.5	3 + br
2313.10	1 +	47.7	1 + br	54.5	1 + br	22.61	20
68.30	2	55.79	30	95.70	50 +	22.81	20
68.48	2	98.12	50 u ¹⁾	3756.5	2 + br	30.2	2 + br
68.65	2	2938.40	100 u ¹⁾	93.0	50 + br	50.8	2 + br, d?
94.0	1 +	89.10	20 u ¹⁾	3811.4	2 + br	52.3	2 + br
2400.97	15	93.39	10	16.3	4 + br	97.60	10 +
02.08	1 +	3024.77	30 u ¹⁾	46.2	2 + br	4908.0	1 + br
14.88	20	35.10	3 + r	49.2	1 + br	93.6	2 +
46.3	1 + br	39.2	1 + br	64.4	10 + br	5079.6	3 +
89	2 + br	39.8	1 + br	88.10	1 +	5124.5	10 +
99.60	1 +	67.78	200 u	88.39	1 +	44.7	20 +
2515.79	1 +	76.75	4	4079.40	30 +	5202.5	2 + br
24.67	3 +	3111.5	1 + br	4121.75	5	09.45	30 +
33	1 + br	15.5	2 + br	22.08	6	70.2	2 +
44.5	1 + br	3296	1 + br	4220.65	1 +	70.6	2 +
82.3	1 + br	99.8	1 + br	54.4	1 + br	71.2	2 +
2613.77	1	3393.2	1 + br	59.85	100 + br	5656.0	1 + br
28.17	30	94.2	1 + br	72.6	5 + r	5718.8	1 +
53.20	1 +	97.41	20 r	75.3	1 + br	19.2	1 +
96.80	4	3405.4	1 + br	4302.25	50 + br	19.9	1 +

IX. Bo. Bor.

Ältere Messungen: J. M. Eder und E. Valenta, Denkschr. der k. Akademie in Wien, 60 (1893).

Material: Borsäure auf Kohle.

Verunreinigungen: Keine.

Linienzahl: 3.

2496.87	10 u ¹⁾
97.79	20 u ¹⁾
3451.49	20

¹⁾ Rote Komponente stärker.

X. Br. Brom.

Ältere Messungen: A. de Gramont, Ann. chim. phys., 10 (1896)
 J. M. Eder und E. Valenta, Denkschr. der K. Akad. der Wiss. in
 Wien, 68 (1899) (Geißlerrohr).

Material: Bromkalium auf Gaskohle.

Verunreinigungen: Keine.

Linienzahl: 153.

2386·9	2 + br	2952·2	1 + br	3253·0	1 + br	3693·65	3 +
89·2	1 + br	61·3	1 + br	60·9	1 + br	3840·00	1 + br
89·9	2 + br	67·2	2 + br	61·8	1 + br	92·2	1 + br
92·5	1 + br	69·20	4 +	67·2	1 + br	3904·1	1 + br
2488·7	1 + br	72·3	3 + br	70·25	2 +	15·3	1 + br
2521·90	2 +	76·0	1 + br	80·75	1 + br	25·0	2 + br
41·6	2 + br	82·1	1 + br	82·3	2 + br	40	2 + br
57·0	2 + br	83·8	1 + br	91·2	2 + br	51·3	1 + br
79·5	1 + br	85·0	1 + br	96·55	1 +	81·0	3 + br
89·6	1 + br	94·35	3 +	3301·4	2 + br	86·6	1 + br
93·9	2 + br	3016·4	1 + br	21·17	2 +	4140·3	1 + br
2606·8	1 + br	20·95	4 +	30·0	1 + br	79·65	1 +
13·7	1 + br	33·85	1 +	33·20	5 +	93·6	1 + br
27·1	1 + br	36·60	1 +	49·95	3 +	4224·0	3 + br
60·7	1 + br	47·2	1 + br	71·2	1 + br	25·75	1 +
90·4	1 + br	56·2	1 + br	97·20	3 +	91·4	2 + br
2714·0	1 + br	57·8	1 + br	98·1	1 + br	4365·80	4 +
19·2	1 + br	59·3	1 + br	3402·70	3 +	4512·7	1 + br
46·5	1 + br	68·3	1 + br	14·55	3 +	38·8	1 + br
66·9	2 + br	74·55	4 +	16·5	1 + br	43·0	2 + br
70·7	1 + br	92·0	1 + br	17·75	3 +	4622·80	3 +
2807·6	1 + br	3116·1	2 + br	34·1	1 + br	52·3	1 + br
43·1	1 + br	17·55	2 +	40·8	1 + br	72·6	1 + br
46·2	1 + br	29·8	1 + br	77·2	1 + br	78·70	8 +
67·1	1 + br	30·4	1 + br	88·0	1 + br	93·30	3 +
72·7	2 + br	47·95	2 +	3506·60	5 +	4704·90	20 +
75·6	1 + br	49·7	1 + br	17·50	5 +	19·80	3 +
84·0	1 + br	62·9	2 + br	29·0	3 + br	42·75	3 +
92·3	2 + br	65·7	1 + br	40·30	8 +	67·10	3 +
2901·30	1 + br	67·7	3 + br	51·15	3 +	76·5	2 + br
02·00	1 + br	74·3	2 + br	62·50	10 +	85·45	10 +
07·8	1 + br	85·4	1 + br	68·9	1 + br	4816·69	8 +
10·8	1 + br	98·9	2 + br	91·55	1 +	49·8	1 + br
17·4	1 + br	99·8	1 + br	3600·80	3 +	4928·8	1 + br
22·1	1 + br	3203·1	1 + br	12·6	1 + br	30·6	1 + br
27·10	5 +	14·6	1 + br	22	1 + br	5182·45	3 +
28·95	1 +	21·2	2 + br	60·0	2 + br	5238·4	2 + br
35·4	1 + br	38·0	2 + br	69·5	1 + br	5332·25	2 + br
35·9	1 + br						

XI. C. Kohlenstoff.

Ältere Messungen: J. M. Eder und E. Valenta, Denkschr. der K. Akad. der Wiss. in Wien, 60 (1893). H. Deslandres C. R., 120 (1895). A. de Gramont C. R., 125 (1897).

Material: Gaskohle, Sibirischer Graphit, Carbone sublimé von Prof. H. Moissan.

Verunreinigungen: Al, Ba, Bo, Ca, Cu, Fe, Mg, Mn, Si, Ti.

Linienzahl: 28.

2296·96	5	2837·80	2 +	4395·35	1 + br	4772·0	1 + br
2478·71	20	2968·0	1 + br	4411·0	2 + br	5133·4	1 + br
2509·20	3	93·5	1 + br	33	2 + br	43·6	1 + br
12·16	4	3165·65	1 +	81·2	1 + br	45·4	1 + br
2641·3	1 + br	3921·6	3 + br	4530·3	1 + br, C?	51·3	1 + br
2747·2	1 + br	4267·1	10 + br	4667·45	1 +	6578·20	3 +
2836·90	4 +	4373·5	2 + br	73·9	1 + br	83·05	2 +

Kanten.

3584·03	K. V.	4158·18	K. V.	4514·95	K. V.	4697·59	K. V.
85·97	K. V.	67·79	K. V.	32·03	K. V.	4715·20	K. V.
90·49	K. V.	81·00	K. V.	53·30	K. V.	37·02	K. V.
3861·70	K. V.	97·23	K. V.	78·16	K. V.	5129·30	K. V.
61·86	K. V.	4216·13	K. V.	4606·28	K. V.	65·30	K. V.
71·51	K. V.	4502·28	K. V.	85·00	K. V.	5635·04	K. V.
83·50	K. V.						

XII. Ca. Calcium.

Ältere Messungen: J. M. Eder und E. Valenta, Wien. Anz. (1892) Denkschr. der K. Akad. der Wiss. in Wien, 67 (1898). Sitzber. der K. Akad. der Wiss. in Wien, 118, II a (1909). F. L. Cooper, Astroph. Journ., 29 (1909).

Material: Calciumchlorid auf Gaskohle.

Verunreinigungen: Ba, Na, Sr.

Linienzahl: 84.

2208·9	1 + br	2999·75	1	3179·51	50 u ¹⁾	3630·86	3 +
2373·27	1 +	3000·97	2	81·60	10 r	44·53	4 +
98·66	1 u ¹⁾	06·94	3	3487·88	1 +	3706·30	50 r
2995·06	2	09·30	2	3602·2	1 + br	37·35	50 r
97·42	2	3159·06	50 u ¹⁾	24·20	2 +	3933·81	1000 u

¹⁾ Rote Komponente stärker.

3949.00	1 - -	4355.6	1 - -br, r	5041.89	2	5603.08	3
57.22	2 - -	4425.62	20	5189.00	4	5857.70	4
68.62	500 u	35.20	20	5260.63	1 - -	6102.98	3
73.95	2	35.88	15	61.87	3	22.50	8
4093.0	1 - - r	55.01	30 u	62.40	3	61.62	1 - -
95.3	2 - - r	56.12	15	64.41	3	62.43	10
99.0	2 - - r	56.80	5	65.72	5	64.07	1 - -
4132.7	1 - -	4527.22	2 - -br, r	70.43	10	66.71	1
4226.89	100 u	78.71	4	5349.62	5	69.33	2
40.57	1 - -	81.62	5	5513.19	2	69.83	2
83.17	20	86.03	8	82.19	3	6439.35	5
89.50	20	4685.35	1 - - br	89.00	10	50.08	2
99.13	20	4703.35	1 - - br	90.31	3	62.82	5
4302.68	50	40.4	1 - - br	94.70	8	71.94	2
07.92	20	4812.07	1	98.67	8	94.08	3
18.81	30	78.35	8	5601.49	3	99.94	1

XIII. Cd. Cadmium.

Ältere Messungen: J. M. Eder und E. Valenta, Denkschr. der K. Akad. der Wiss. in Wien, 61 (1894) und Sitzber. der K. Akad. der Wiss. in Wien, 118, II a (1909).

Material: Metall von E. Merck.

Verunreinigungen: C, Ca, Cu, Fe, Pb.

Linienzahl: 129.

2111.69	2	2418.78	2	2881.0	3	- br	3089.3	1 - -	
44.50	4 u	26.45	1	2911.0	1 - -	br	92.45	1 - -	
55.1	1 - -	69.85	3	48.3	1 - -	br	95.70	3 - -	
68.6	1 - - br	88.04	2	52.0	1 - -	br	3113.05	1 - -	
87.89	1	95.75	1	71.4	1 - -	br	19.0	2 - - br	
94.70	4 u	99.96	2	80.8	3	- br	21.95	2 - -	
2204.4	1 - -	2552.3	1 - - br	87.4	1 - -		24.55	2 - -	
09.8	1 - -	73.18	30	96.25	1 - -	br	29.37	3 - -	
24.51	2	2618.91	1	3009.1	1 - -	br	33.50	3 - -	
39.91	3	39.7	1 - - br	14.5	1 - -	br	54.3	1 - - br	
48.93	1 - -	68.3	1	17.5	1 - -	br	57.19	2 - -	
65.11	10 u	77.9	1 - - br	35.85	1 - -		61.0	1 - - br	
67.51	2	2707.13	1	49.0	2		61.99	3 - -	
88.09	10 u	27.2	1 - - br	53.3	1 - -	br	73.70	2 - -	
2306.72	3	48.85	50	59.4	1 - -	br	74.56	2 - -	
12.90	20 u	67.11	1	65.2	2	- br	76.9	1 - - br	
21.25	10	75.3	1 - - br	69.2	1 - -	br	78.68	1 - -	
29.36	8	2805.73	1	77.3	1 - -	br	85.68	3 - -	
75.0	1 - - br	34.25	1	81.1	2 - -	r	97.9	1 - - br	
76.91	1	37.2	2	85.10	3	-	3210.2	2	- br
2418.33	1	68.5	1 - - br	88.55	1 - -		17.9	2 - - br	

3221·67	1 +	3500·3	1 + br	4095·0	2 + br	5338·4	2 + br
36·85	1 +	35·83	4	4114·8	1 + br	79·0	3 + br
50·51	10	3610·61	100 u ¹⁾	27·4	1 + br	5497·6	50 + br
52·8	3 + r	12·99	15	58·3	1 + br	5674·1	1 + br
61·21	5	14·60	2	4307·1	1 + br, r	5736·9	1 + br
64·6	1 + br	3940·6	1 + br	4413·21	2	61·78	1 +
83·98	2 +	59·2	2 + br	15·89	20	62·7	1 + br
86·15	1 +	77·3	2 + br	4662·75	2 + r	6325·4	1 + br
3385·6	1 + br	85·0	1 + br	78·42	50	6439·1	200 + br, r
3403·72	30	88·3	1 + br	4800·35	100 +	64·8	1 + br
66·34	30 u ¹⁾	92·0	1 + br	5086·10	50 r	69	1 + br
67·77	15						

XIV. Ce. Cer.

Ältere Messungen: O. Lohse, Ber. der Berl. Akad. (1897) (λ 4000 bis λ 4700).

Material: Cerammonnitrat von L. Haitinger, auf Gaskohle.

Verunreinigungen: La, Nd, Pr.

Linienzahl: 1758.

2180·74	1	2477·40	1 +	3055·71	4	3171·80	1 La?
2222·14	1	79·57	1	56·66	2 +	83·70	1
25·20	2	83·95	1	57·32	2 +	86·33	1
27·96	2	97·62	1	57·71	2 +	94·98	1
28·13	1	2532·11	1	63·14	2	3201·90	1
42·40	1	48·88	1 +	84·56	1	19·11	1
65·00	1	78·40	1 +	85·19	2	21·35	1
87·91	1	2603·72	3	3103·52	1	27·26	1
2300·74	1	35·3	1 +	07·10	1	28·72	1
02·20	1	49·49	1 +	07·62	1	31·43	1
17·46	1	51·12	1	10·65	2	34·35	1
18·77	2	62·95	1	11·22	1	35·10	1 - +
24·48	1	73·00	1	21·68	3	36·90	1
37·80	1 +	2730·16	1	30·5	1 +	43·55	1
50·24	2	43·84	1	31·05	1	52·63	1
62·70	1 +	49·02	1	33·47	1 +	61·2	2 - +
67·90	1 +	68·48	1	41·36	2	72·42	2
72·46	2	2849·45	1	44·06	2	75·01	1
77·25	1	2931·67	1	44·68	1 +	80·00	1
77·61	1	77·02	1	45·38	1 +	85·39	1
80·29	2	95·77	1	46·50	1 +	95·48	1
2431·60	2	3017·29	1	47·15	2	97·05	1
39·40	1	22·81	1	55·88	1 +	3300·33	1
54·46	1	31·71	3	64·37	1 +	05·03	1
70·05	2	52·15	1 +	69·37	1	12·35	1

¹⁾ Violette Komponente stärker.

3317.48	1 +	3465.08	1	3533.75	1 +	3594.2	1 +
25.42	1	67.98	1	34.21	2	94.75	1 +
34.58	1	68.26	1	34.60	1	96.27	1
42.01	1	71.05	5	35.73	1 +	98.36	1
44.00	1	74.41	1	36.84	1 +	3600.16	1
44.91	2	77.01	2	37.3	1 +	00.76	1
53.41	3	80.49	1 +	37.6	1 +	03.50	1
57.36	1	81.16	1 +	38.95	1	04.36	1
60.69	1	81.34	1 +	39.23	2	07.80	2
61.97	1 +	82.31	1 +	43.43	1	09.84	3
66.70	1	82.53	1	44.17	3	11.12	1
68.90	1	84.93	1	45.79	1	11.51	1
71.33	1	85.21	2	45.93	1	12.50	1
73.60	1	88.69	1	46.35	1	13.86	2
73.87	1	90.29	1	46.82	1	16.35	1 + d?
75.90	1	93.3	1 +	47.17	1	18.71	1
77.31	2	94.0	1 +	48.98	1	21.30	1
79.33	1	96.12	1	49.2	1 +	22.30	2
81.66	1	96.51	1 +	51.56	1 +	22.50	1 +
83.65	1	97.92	2 +	51.82	1 +	23.96	3
94.20	1 u	3500.89	1 +	52.88	1	28.40	1
95.88	1 +	01.64	1	54.79	1	30.59	1
99.1	1 +	03.20	1 +	55.15	2	31.35	1
3405.1	1 +	04.75	3	55.25	1 +	32.24	1
06.10	1	08.10	1	57.05	1 +	32.4	1 +
07.37	1	08.62	1	60.99	4 r	37.93	1
16.72	1	08.86	1	61.3	1 +	38.44	1
17.00	1	10.9	1 +	63.95	1	40.9	1 +
17.58	1	11.75	1	68.28	1	41.75	1 +
20.35	1	13.98	1	69.44	1	41.9	1 +
22.85	2	15.9	1 + br	72.57	1	43.0	1 +
24.02	1 +	17.52	2	73.86	1 +	44.45	1
26.32	1	18.50	1	75.4	1 +	45.40	1
27.45	2 +	19.19	1	76.40	1	45.61	1
30.44	1 +	19.90	1 +	77.61	4 r	46.80	1
31.15	1 +	20.67	1	78.88	1	47.13	2
33.22	1	22.01	2	80.75	1 +	48.13	2
39.95	1	24.18	1	80.95	1 +	49.90	1
40.73	1	26.83	1	83.83	1	50.31	1
41.35	1	27.96	1	84.49	1	51.04	2
42.54	1	28.18	1	84.91	1	51.82	1
43.76	3	28.75	1	86.00	1	52.27	1
51.80	1	29.2	1 +	86.90	1	52.40	1
54.52	4	29.4	1 +	87.37	1	53.27	2
56.92	1	30.17	1	87.80	2	53.83	2
59.52	4	31.07	1	88.27	1	55.06	1
63.41	1	31.74	1	88.61	2	56.00	3
63.91	1	32.74	1	90.49	1	56.9	1 +
64.32	1	33.00	1	90.77	2	58.4	1 +

Funkens

Ce

3659.40	2	3702.97	1	3746.25	1	3777.80	1
60.13	2	05.17	2	46.54	2	77.98	1
60.30	2	07.13	1	48.23	3	78.90	1
60.82	2	07.57	1	50.27	2	79.9	1
61.90	1	07.81	1	51.18	1	80.66	1
62.08	1	09.48	3 r	51.60	2	81.30	1
63.15	1	10.13	3	52.51	2 +	81.80	3
63.85	1	14.15	1	53.27	1 +	82.70	3
64.90	1	14.95	1	53.95	1	83.19	1
65.17	1 +	15.30	1	54.43	1	83.70	2
65.70	1 +	15.64	1	54.66	1	84.0	1
67.44	1	16.53	3	55.57	2	84.5	1
68.15	3	17.08	1	55.86	2	85.5	1
68.89	1	17.65	1	56.44	1	85.65	1
70.70	1	18.35	2	57.86	2	86.81	3
70.80	1	18.56	3	58.01	1	87.33	2
72.12	1	19.98	1	58.67	1	87.68	1
72.36	1	20.08	1	59.33	1 + d(La)?	88.06	1
72.96	2	22.30	1	60.55	1 +	88.36	1
73.83	1	22.47	1	60.88	1	88.65	1
74.30	1	22.95	1	62.47	1 +	88.93	3
75.55	1 +	24.83	1	63.14	3	90.1	1
76.31	1	25.85	2	63.80	1	90.6	1
77.3	1 +	26.63	1	64.32	3 r	91.0	1
79.00	1	27.14	1	64.78	1	91.85	1
79.31	1	27.55	1	65.19	2	92.50	2
79.58	2	28.17	2	66.05	1	93.0	
80.27	1	28.30	1	66.65	1	93.65	
81.02	1	28.61	3 r	66.8	1 +	93.95	
81.55	1	29.2	1 +	68.15	1 +	94.51	
82.25	1	30.12	1	68.43	1 +	94.85	
82.83	1	30.54	1	68.92	2	95.44	
84.4	1 +	31.4	1 +	69.20	1	95.95	
85.3	1 + br	32.06	1	70.11	2	96.31	
86.45	1 +	32.75	1	70.93	2	96.83	
87.96	1	33.70	1	71.75	2	97.05	
88.81	1	35.05	1	71.85	1 +	98.05	
89.33	1	36.65	1 +	72.30	1 +	99.2	
93.59	1	37.30	1 Fe?	72.80	1	99.35	
93.90	1	37.75	1 +	73.05	1	3800.20	
95.07	1	37.89	2	73.37	1	00.47	
96.15	1	39.90	1 +	73.64	1	01.71	
96.25	1	40.31	1	74.23	1	02.92	
97.84	1	41.19	1	74.72	1	03.25	
98.28	1	41.58	1	75.4	1 +	04.05	
98.53	1	41.95	1 d	76.15	1 +	04.30	
98.84	1	44.22	1	76.30	1	04.87	
99.35	1	44.87	1	76.75	2	05.65	
3700.07	1	45.75	1	77.20	1	06.30	

3807.00	1	3834.90	1	3865.27	1	3891.95	1
07.85	2	35.30	1 La?	66.15	1	93.40	1
08.25	3 r	35.49	1	66.32	1 +	94.02	1
08.83	1	35.95	1 + d	66.63	1 +	94.46	1
09.36	2	36.25	2	66.98	1	95.29	2
09.63	1	36.65	2	67.15	1 +	96.98	3
09.87	1	37.33	1	67.80	1	97.56	1
10.28	1	37.50	1	67.95	1	98.42	2
10.42	1	37.77	1	68.29	2	99.09	1
10.7	1 +	38.01	1	68.69	2	99.52	1
11.09	1	38.71	3	68.95	1 +	3900.35	1
11.50	1	39.64	1	69.27	1 +	01.47	1
11.77	1	42.15	1 +	69.54	1	01.85	1
12.2	1 +	43.13	2	69.78	1	03.40	2
12.38	2	43.57	1	71.03	2	04.09	1
13.47	1 +	43.92	1	71.57	2	04.50	2
13.7	1 +	44.15	1 Cy?	72.00	1	04.72	1 +
14.69	2	45.17	1	73.16	1	05.45	1
15.02	1	45.50	1 +	73.45	1	07.10	1
15.12	1	45.60	2	73.72	1	07.45	2
17.17	1 +	46.12	1	74.50	1	07.55	2 r
17.57	2	46.65	1	74.89	2	08.65	2
17.80	1 +	46.75	1	75.21	2	08.90	1
18.40	1	48.25	1	75.50	2 +	09.20	1
18.84	1	48.73	2	76.27	1	09.47	1
19.17	2	49.77	1	76.60	1 +	09.90	1
19.37	2	49.87	1	77.15	2	10.08	1
21.00	2	50.30	2	77.63	1	10.82	1
21.43	2	51.47	1	78.53	2	11.45	1
21.90	2	51.75	1 +	79.22	1	12.34	1
22.45	1	52.31	1	79.80	1	12.60	3
23.2	1 +	52.57	2	80.55	2	14.12	1
24.02	3	53.32	2	81.83	2	14.27	1
24.95	1 +	53.63	1 +	82.07	2	15.09	1
25.80	1	54.35	3	82.60	3	15.66	2
27.07	1	54.48	3	83.50	3	16.27	2
27.52	2	54.7	1 + br	83.68	2 +	17.01	1
29.58	2	55.45	2	84.34	1	17.36	1
29.82	2	57.15	2	84.88	1	17.75	2
30.17	2	57.40	2	85.90	1	18.40	3
30.76	2	57.83	2	86.43	1	19.94	3
31.21	3	58.07	2	86.65	1	21.90	3
31.9	2 + br	60.38	1	89.14	1	23.25	3
32.40	1	60.59	1	89.43	1	24.78	2
32.60	1	62.65	2	89.61	1	24.95	1
32.86	1	63.12	1	90.20	3 r	26.4	1 + d
33.20	1	64.23	1	90.67	1	27.12	1
33.95	1	64.47	1	90.91	1	27.50	1
34.70	2	64.71	1	91.16	1	27.70	1

3928·42	1	3959·01	2	4001·90	2	4048·53	1
28·96	1	59·85	1	03·01	2	49·20	1
29·22	1	59·97	1	03·10	1	49·30	1
30·10	1	60·55	1	03·35	1	49·98	1
30·93	1	61·08	3	03·95	4 r	51·00	2
31·21	2	61·71	2	04·73	1	51·60	2
31·50	2	62·23	2	05·80	2	52·20	3
31·96	2	63·55	1	07·85	2	53·25	1
32·31	2	64·33	2	08·63	1 +	53·70	4
33·15	1	64·66	2	08·82	1	55·13	3
34·89	1	67·09	2	09·25	1	55·35	1 +
35·4	1 +	67·33	2	10·30	2	56·00	1 +
35·68	1 +	67·70	1	11·75	1	56·50	1 +
36·05	1	70·19	2	12·58	10	57·07	2
37·30	1	70·59	1	15·05	4	58·44	1
37·84	1	70·80	1	16·02	2	58·95	1
37·93	1	72·21	2	16·2	1 +	59·55	1 +
38·23	2	73·2	1 + br	17·73	2 +	60·67	2
38·75	1	74·1	1 + br	19·20	2	60·93	1
39·70	1	74·35	1	19·64	1	61·63	1
39·80	1	74·67	1	20·05	2	62·41	4
40·49	3	75·69	2	20·71	1	63·15	3
40·8	1 +	76·19	1	22·44	2	64·13	1
41·14	2	76·90	1	23·55	1	65·07	1
42·35	4	77·68	1	23·80	1	65·35	2
42·90	5	77·92	2	24·67	5	66·70	2
43·30	1	78·80	3	25·31	2	67·45	3
43·64	1	80·11	1	26·02	1	67·92	1
44·05	3 r	81·05	3 r	27·16	1 +	68·64	2
45·04	2	82·07	1	27·85	3 +	69·01	3
46·33	1 +	83·06	3	28·0	2 +	70·30	3 +
46·85	1	83·44	3	28·55	4 r	71·03	1
48·14	2	84·82	3 r	29·38	1	71·29	1
49·08	1 +	86·55	1	30·35	1 +	71·95	3
49·98	1	89·58	3	30·50	2	73·10	2
50·62	1	90·26	1 Nd?	31·48	4 r	73·61	4
51·01	1	90·85	1	32·7	1 +	73·95	3 +
51·61	1	91·45	1	37·55	1	74·80	1
51·80	1	92·30	1	37·82	2	75·85	3
52·28	1	92·52	3	38·40	2	76·01	3
52·75	8 r	93·05	2	40·05	1	76·41	2
53·81	2	93·99	4	40·91	8	77·00	1
54·12	1	96·6	1 +	41·45	1	77·60	2
55·51	2	96·9	1 +	42·32	1	78·45	3
56·1	1 + d	97·86	2	42·73	5	78·72	3
56·44	3	99·40	6	43·6	1 +	79·16	1
57·05	1	4000·90	1 d	45·40	4	79·45	1
58·12	2	01·23	1	46·51	4 r	79·85	2
58·40	2	01·68	2	47·46	1	80·65	3

Ce

Funkens

4081.40	4	4124.01	5 r	4165.75	10	4215.7	1 +	Sr?
82.30	1	24.92	4	66.37	1	17.71	3	La?
83.40	5	25.57	1	66.85	1	19.9	1 +	
83.8	3 +	25.95	1	67.03	5	20.75	1 +	
84.82	1	26.80	1	67.96	3	20.93	1 +	
85.41	3	27.06	1 +	70.00	5	21.33	1	
85.92	1	27.51	4	71.2	1 +	22.80	5 r	
86.61	2	27.92	2	71.56	1	24.07	1	
87.47	2	28.23	2	72.31	1	24.73	1	
87.70	2	28.53	3	74.61	1	27.93	4	
88.75	1	29.30	2	75.40	1	28.46	1	
89.05	2 + r	30.84	4	76.22	1	30.35	1 +	
89.91	2 +	31.26	4	76.83	3	30.7	1 +	
90.65	2	31.99	1	79.27	1	31.94	2	
91.13	2	32.45	1	79.45	1	32.20	1	
92.00	1	32.80	1	81.25	3	32.75	1	
92.25	1	33.98	10	82.5	1 +	33.38	1	
92.89	2	35.60	3	85.51	3	34.39	2	
94.11	2	36.05	2	86.71	10	34.92	1	
96.00	1	37.00	2 +	87.49	3	36.17	1	
99.14	2	37.78	10	89.33	1	36.51	1	
99.54	1	38.25	2	89.79	1 +	37.36	1 +	
99.89	2	38.51	2	90.79	2	40.09	5	
4101.92	5	39.60	1	91.20	2	41.60	1	
02.54	2	39.99	1	91.50	1 +	42.20	1	
04.60	1	40.7	1 +	93.21	4	42.90	3	
05.15	4	40.95	1 +	93.45	4	43.90	1	
06.33	2	42.59	5	94.02	3	46.09	5	
07.03	3	42.98	2	95.04	3	46.56	1	
07.60	4	44.66	3	95.98	1	46.86	3	
07.95	1	45.19	8	96.48	4	47.63	1	
08.39	1	46.40	4	97.75	1	48.27	1	
08.90	1 +	48.34	2	97.83	1	48.81	6	
09.70	1	49.06	3	98.15	2	51.79	1	
10.52	3	50.09	10	98.58	1	52.03	1	
11.02	1	51.09	3	98.85	6	53.54	2	
11.54	3	52.19	10	4201.45	4	54.98	1	
13.89	2	53.10	1	03.10	5	55.10	1	
14.29	2	53.30	1	03.69	1	55.94	3	
15.52	5	54.09	1	04.90	1	56.32	2	
17.14	3	55.45	1 +	05.32	1	57.30	1	
17.45	2	55.69	2	06.03	1	58.54	1	
17.75	2	59.20	4	06.99	1	59.93	1	
18.30	6	60.35	2	08.42	1 +	61.33	1	
19.15	3	61.34	2	08.58	1 +	63.59	2	
20.00	8	62.0	1 +	09.59	2	64.14	1	
21.00	3	62.1	1 +	10.20	1	64.55	1	
21.76	1	62.79	2	13.22	1	64.87	1	
23.65	3	63.70	4	14.20	2	67.45	1 +	

4678.18	1	4742.48	1 +	4812.70	1 +	5208.61	1
78.80	1 +	42.65	1	14.82	1 +	34.15	1 + br
80.30	2	45.11	2	18.50	1 +	37.25	1 + br
80.63	1	47.30	2	18.73	1 +	52.87	1 +
81.19	1	48.41	1 +	20.21	1	65.85	2
83.25	1	49.40	1 +	21.25	1 +	74.40	3
84.79	3	49.69	1 +	22.30	1	75.95	1 + br
85.40	1	51.74	1	22.73	1	5330.75	2
86.95	2	52.48	1	35.81	1 +	48.0	1 + br
87.79	1	53.84	1	36.85	1	53.71	5
89.07	1	55.69	1	38.7	1 + br	59.70	1
89.65	1	56.30	1 +	39.80	1 +	78.52	1 +
90.35	1	58.05	2	45.70	1	86.96	1
90.70	1	58.70	1 +	46.74	1	93.62	3
92.23	1	60.10	1	48.00	2	5409.47	3
94.57	1	64.11	1	50.09	1	18.05	1 +
95.07	1	64.25	1 +	50.40	1 +	41.98	1 +
96.73	1 +	64.95	1	50.90	1 +	49.50	1
96.96	1	65.46	1	51.05	1 +	51.45	1 +
4701.62	1	66.05	1	58.90	1	58.33	1
02.18	1	68.38	1	59.71	1 +	59.40	1
02.89	1	68.96	2	65.30	1 +	60.26	1
04.18	1	74.11	3	66.55	1 +	64.41	1
06.00	1 +	75.00	1 +	74.13	1	68.57	3
06.61	1 +	75.65	1	82.61	3	72.48	3
07.19	1 +	75.96	1	91.44	1 +	81.52	1
07.40	1 +	76.47	1 +	92.00	1 +	85.06	1 +
08.10	1	77.05	1 +	94.10	2	5509.70	1
10.16	1	77.40	1 +	4915.10	1	12.29	3
12.61	1	80.41	1 +	43.60	1	13.35	1 +
14.18	3	81.97	1 +	44.76	1	16.30	1
15.00	2	82.40	1 +	49.64	1 +	18.71	2
18.05	2	84.15	1	71.68	2	20.42	1
18.61	1	84.99	1 +	94.8	1 + br	22.05	1
19.67	1 +	87.35	1 +	5002.95	1	24.70	1 + br
22.48	1	88.47	1 +	11.93	1	27.05	1
22.93	1 +	93.35	1	23.03	1	35.45	1 +
23.50	1	93.51	1	37.9	1 + br	37.50	1 +
24.50	1 +	95.39	1	44.20	1	49.00	1 +
25.26	2	95.75	1	67.30	1 +	50.26	1
27.02	1 +	97.55	1 +	75.52	1	56.50	1 +
27.80	1 +	98.68	1 +	76.70	1 +	57.18	2
30.27	2	4801.11	1	79.89	2	59.45	1
32.56	1	06.11	1	5117.33	1	61.68	1
35.33	1	06.37	1	47.73	1	65.20	1
37.42	3	06.68	1	87.61	2	66.20	1
39.30	1	07.85	1 +	91.80	1	82.82	1
39.69	2	08.79	1 +	5205.67	1 +	94.95	1
41.80	1	09.95	1 +	06.23	1 +	95.20	1 +

5596.14	1	5679.25	1 +	5800.03	1	6143.57	1 +
99.30	1	80.50	1 +	38.36	1	6229.2	1 + br
5601.54	1	83.33	1 +	5923.24	1 +	32.70	1 +
10.47	1	83.98	1 +	28.57	1 +	72.30	2
10.73	1 +	86.05	1	41.09	1	99.76	1 +
11.11	1	96.05	1	41.78	1	6321.6	1 + br
13.93	1	97.22	1	59.92	1	44.22	1
23.24	1 +	99.44	1	76.07	2	71.34	1
30.60	1 +	5703.45	1 +	95.55	1 +	93.30	1
37.60	1	11.68	1	6034.45	1 +	6425.55	1
55.37	1	15.47	1	43.66	2	67.12	1
69.14	2	69.15	1	98.57	1	73.9	1 + br
70.19	1	84.3	1 + br	6108.99	1	6513.93	1 +
77.96	1						

XV. Cl. Chlor.

Ältere Messungen: A. de Gramont, Ann. chim. phys., 10 (1896).
 J. M. Eder und E. Valenta (Geißlerrohr), Wien. Anz. (1898); Denkschr. der K. Akad. der Wiss. in Wien, 58 (1899).

Material: Kaliumchlorid auf Gaskohle.

Verunreinigungen: Keine.

Linienzahl: 101.

2928.9	1 + br	3353.55	3 +	3805.6	2 + br	4158.3	1 + br
36.8	1 + br	67.5	1 + br	10.2	2 + br	4254.3	2 + br
60.6	1 + br	77.4	2 + br	18.5	2 + br	77.6	1 + br
3071.4	1 + br	92.95	2 +	20.7	1 + br	91.90	2 +
3123.9	1 + br	93.60	2 +	28.3	2 + br	4304.25	1 +
29.6	1 + br	3404.8	1 + br	34.1	2 + br	07.85	3 +
91.55	3 +	22.5	1 + br	38	1 + br	36.7	2 + br
3221.2	2 + br	33.4	1 + br	44.0	2 + br	43.90	5 +
44.4	1 + br	40.8	1 + br	46.2	2 + br	73.2	2 + br
48.6	1 + br	3530.15	2 +	51.8	3 + br	4423.9	1 + br
59.3	2 + br	60.80	2 +	61.6	5 + br	25.7	1 + br
61.7	1 + br	83.9	1 + br	69.2	1 + br	82.0	1 + br
76.8	1 + br	3602.20	4 +	3914.40	2 +	90.3	1 + br
83.5	1 + br	12.92	3 +	17.2	1 + br	4570.2	1 + br
85.9	1 + br	22.78	1 +	21.95	1 + br	73.1	1 + br
89.85	1 +	50.28	1 +	43.1	1 + br	4667.5	1 + br
91.2	2 + br	57.05	1 +	91.70	2 +	4740.4	1 + br
3315.6	1 + br	58.50	1 +	4018.7	1 + br	68.80	2 +
18.8	1 + br	59.9	1 + br	26	1 + br	71.2	1 + br
20.5	2 + br	70.4	1 + br	39.8	1 + br	80.1	1 + br
33.9	1 + br	74.0	1 + br	59.4	1 + br	81.40	3 +
36.2	1 + br	3720.55	1 +	94.6	1 + br	94.65	30 +
40.50	3 +	99.6	2 + br	4132.73	10 +	4810.10	20 +

4819·52	10 +	5078·25	2 +	5221·5	1 + - br	5423·65	2
96·80	2 +	5218·0	1 + br	5392·25	2 +	43·7	1 br
4904·85	2 +						

XVI. Co. Cobalt.

Ältere Messungen: Fehlen.

Material: Metall von C. Schuchardt.

Verunreinigungen: C, Ca, Cu, Fe, Mg, Mn, Ni.

Linienzahl: 1360.

2173·44	1	2221·9	1 + - Ni?	2256·10	1 + -	2285·00	1
74·13	1	22·33	1	56·21	1 + - Ni?	85·88	1
75·25	1 Ni?	23·03	2	56·82	3	86·25	6 n
78·7	1 +	24·14	1	57·9	1 + - br	87·93	1
80·25	1 +	24·47	1	58·72	1	88·66	1
81·8	1 +	24·93	2	59·21	1	89·18	1
82·09	1	26·40	2	60·10	3	90·42	1
87·13	1	30·58	2 +	61·39	1	90·70	1
89·07	1	32·14	2	61·65	1	91·49	2 +
90·79	2	32·55	1 +	62·69	1	92·08	3
92·59	2	34·9	1 +	63·61	1 +	92·50	1
93·70	2	35·15	1 +	64·27	1 +	92·80	1
98·38	1	36·88	1	64·96	1	93·50	2
2200·50	1	39·85	1	65·4	1 + - Ni?	93·65	2 +
03·05	2	40·20	1	65·81	1	95·30	1
05·16	1	41·30	1	66·61	2	96·01	2 +
05·61	1	41·71	1	66·88	1	97·21	2 Ni?
05·94	1	43·0	1 +	68·23	1	97·45	1
06·30	2	43·95	1 +	68·81	1	97·57	1 Ni?
07·99	2	44·50	1 +	70·05	1	98·35	2
09·1	1 +	45·20	3	71·28	1 +	98·81	2
09·57	1	46·2	1 + - br	72·34	2	99·80	3
11·13	1	48·2	1 + - br	72·89	1 +	2300·56	1
11·50	2	48·74	1	73·72	1 + -	00·86	2 Ni?
13·26	1	50·05	1 +	74·61	1	01·49	2
13·95	1 +	50·47	1 +	75·51	1	04·11	1
14·87	1	50·65	1 +	76·65	1 + -	04·35	1
16·52	2 Ni	51·21	1	77·01	1 + -	06·20	1 +
17·35	1 d	51·40	1	78·06	1 + -	06·90	1
17·77	1 +	52·1	1 + - br	78·57	1	07·12	1
19·14	1	52·45	1 + -	79·13	1	07·60	1
19·95	1	52·90	1 +	80·56	2 + -	07·97	6 n
20·18	2	53·55	2	81·08	1	09·14	1
20·45	1	53·94	2 Ni?	82·01	2	10·36	1
21·35	1 +	55·06	1	82·46	1	10·96	1
21·6	1 +	55·73	1	83·65	2	11·73	6

Co

Funkens

2312.64	2	2351.92	2	2395.60	2	2432.62	5
13.68	2	52.29	2	96.06	1	34.82	1
14.14	3	52.97	1	96.34	1	35.20	2 +
14.75	1	53.49	6	96.80	1 +	35.88	1
15.05	3	54.06	1	97.49	10	36.39	2
15.82	1	54.99	1	98.45	4	36.75	2 Ni?
17.13	3	55.58	1	2400.89	1	37.07	3
18.51	3	56.83	1 +	01.20	1	38.46	1 +
19.35	2	58.31	3	01.61	1 d	39.13	2 Ni?
19.91	2	59.68	1 +	02.20	1	40.2	1 + -
20.11	1	60.59	3	02.95	1 +	41.15	1 + -
21.42	2 +	60.92	2	03.85	2	41.81	2
22.10	2	61.23	2	04.24	3	42.71	5
23.25	1	61.63	3	04.64	3	43.89	4
24.39	5	62.14	1	06.35	1	44.97	1
25.62	1	63.87	10	06.98	1 Ni?	45.65	1
25.85	1	65.17	1	07.46	2 +	46.09	4
26.20	3	67.27	1	07.76	3 +	47.82	10
26.60	3	67.6	1 + br	08.50	3	49.21	3
27.77	3	69.79	1	08.90	3	50.10	6
28.18	1 +	70.84	2	09.56	1 +	52.12	2
29.20	3	71.68	2	11.68	3 r, d	53.3	1 + -
30.45	4	71.93	3	12.40	1	53.91	1
34.13	3	72.58	1 +	12.89	1	54.23	2
34.96	1	72.95	1	12.93	1 +	55.56	1
36.08	1 +	73.18	1	13.70	1	56.30	2
36.29	3	74.7	1 +	14.18	4	58.88	1
37.07	2	75.24	3	14.62	2	59.55	3
37.46	1 +	76.98	1 +	15.40	2 Ni?	60.29	1
37.95	3 (Fe)	77.29	1	16.06	3	60.90	1
38.75	2	78.68	10	16.28	3	62.2	1 +
39.10	2	80.59	1	16.99	5	62.77	1
40.36	1 +	81.06	1	17.75	5	63.77	1
41.19	5	81.84	4	18.61	4	63.86	1
42.34	1	82.43	2	19.2	1 +	64.31	8
43.35	1 +	83.55	8	20.82	6	67.15	4
44.34	3	84.20	1	22.15	1	67.77	1
44.70	2	84.97	1 Ni?	22.66	1	69.61	2
45.32	1	86.44	5	23.74	2 Ni?	70.36	2
45.55	2	86.82	3	23.89	2	71.8	1 + - br
46.20	1	87.57	1	25.59	4	73.00	1
46.61	3	89.01	10 u	25.67	1	74.01	1
47.14	1	89.63	3	26.20	3	74.85	1
47.42	3	91.47	1	27.08	1	75.48	1 +
47.87	2	91.96	1 +	28.39	3	76.52	1 Pb?
48.49	1 +	92.11	1	28.66	1	76.74	2
49.20	1	92.64	3	29.29	1	77.39	3
50.35	1	94.00	3	30.01	2	77.56	3
51.24	2	94.60	3	30.57	1	78.30	3 d

Funken

Co

2479.13	2	2527.53	1	2574.97	5	2636.12	
79.85	1	28.28	2	75.68	2	37.41	
82.76	1 Ni?	28.70	5	79.01	1	38.22	
83.70	2	29.10	2	80.42	20	40.59	
84.30	1	30.19	5	80.96	1	43.20	
84.46	1	30.60	1	81.33	1	44.54	
84.93	1	31.43	1	82.33	10	44.90	
85.43	3	32.27	2	83.27	1	46.54	
86.52	5	33.90	8	84.07	1 Ni?	48.79	
87.21	2	35.42	1	85.26	1	50.07	
87.48	2	36.05	3	85.42	1	50.40	
88.22	1	36.57	2	86.94	1	52.24	
88.55	1	36.88	2	87.52	10	52.91	
90.50	3	37.52	2	89.11	2	53.26	
91.26	1	38.87	1	90.69	1	53.82	
93.67	1	39.54	1	91.75	1	56.02	
94.02	1	40.70	6	93.51	1	56.51	
94.84	1	42.03	10	94.25	1	60.99	
95.66	1	44.31	2	95.39	1	61.17	
96.82	1	44.64	2	2601.10	1	61.77	
97.59	3	45.15	3	03.35	1	63.65	
98.94	5	45.79	1	04.53	3	65.32	
2500.71	1	46.26	2	05.84	3 (Mn)	66.26	
02.23	1+	46.83	5	06.02	2	67.00	
04.63	2	48.02	1	10.9	1	70.94	
06.58	10	48.42	2	12.75	1	72.2	
06.97	1+	48.82	1	13.60	1	72.68	
07.77	1	49.17	1	14.41	6	74.03	
08.08	3	49.40	1	15.40	1	76.06	
10.17	2	52.49	3	16.32	1	78.14	
11.28	4	53.10	2	17.05	1	79.84	
12.18	2 C?	53.45	2	17.95	1	80.22	
12.50	1	54.1	1	19.00	3	80.53	
13.00	1	55.16	2	19.38	1	82.00	
13.19	1	56.90	4	19.91	1	82.28	
14.45	1	57.47	4 r	21.05	1	84.66	
16.22	1	58.70	1 Ni?	22.17	1	85.45	
16.6	1+	59.51	10	22.56	1	86.3	
17.50	3	60.18	8 r	22.82	1	87.0	
17.90	2	61.4	1	23.58	1	88.32	
18.25	1+	62.24	2	23.88	1	89.90	
19.1	1+	62.65	2 (Fe)	24.48	1	92.07	
19.91	10	64.13	15 r	26.99	2	92.35	
20.91	1	65.49	3	27.75	2	93.11	
21.49	3	67.43	2	28.91	2	93.22	
23.03	4	69.82	3	30.10	1	94.79	
24.69	2	72.31	1	30.66	1	95.51	
25.11	5	73.50	1	32.37	10	95.96	
26.15	1	73.60	1	35.01	3	97.14	

2697.95	1	2791.17	1	2930.55	2 + br	3089.71	2
98.50	1 +	92.58	1	43.27	2 +	90.40	1
2700.50	1	94.96	2	47.97	1 +	95.86	1
02.2	1 +	95.70	3	54.86	5	96.55	1 +
02.52	2	96.35	1	55.49	1	96.87	1 +
05.84	1	96.95	1	57.84	1	98.33	2
06.84	5 +	97.23	1	67.06	1	3101.70	3 Ni?
07.60	3 +	98.40	2	73.40	1	02.03	2 Ni?
08.10	2	99.10	1	78.15	1 +	02.54	1
08.54	1	2801.22	1	81.85	1 Ni?	03.87	1
08.96	1 +	02.82	2 Mg	83.76	1	07.2	1 +
09.15	1 +	03.90	1	84.34	1 Ni?	07.67	1 +
10.39	1	07.32	2	85.04	1	09.66	1
14.52	5	10.99	3	87.36	3	10.16	1
16.06	2	15.67	1	89.76	3	10.99	1
16.44	1	15.85	1	95.31	1	11.47	1 +
19.11	1	19.02	1	3000.70	1	13.61	2
21.04	2 +	20.15	1	01.10	1	18.39	1
24.08	1 +	25.38	3	05.95	1	21.56	2
28.00	2 +	35.07	2	08.3	1 +	21.70	2
29.27	1 +	37.29	1	09.04	1 +	26.85	1
31.20	2	42.51	1	13.74	2	27.36	1
33.08	1	45.75	1	15.83	1	29.62	1
34.77	2 + br	48.4	1 + br	17.39	1	30.98	1
38.41	1	50.15	1	17.67	3	34.22	3 Ni?
39.05	2	52.25	1	20.76	1	36.85	1
40.55	1	59.76	1 +	21.21	1	37.46	3
41.15	1	62.74	1 +	22.50	1	37.86	1
41.48	1	65.7	1 + br	26.0	1 +	40.09	3
45.15	3	70.2	1 + br, Mn?	26.51	2	40.8	1 +
48.47	1 +	71.35	4	34.56	1	45.15	1
49.96	1	72.60	1 +	34.79	2	47.18	3
52.23	1 +	78.66	1	39.70	1	49.43	2
53.40	1	79.65	1 +	42.62	2	52.82	1
61.50	1	81.74	2 Si?	44.13	4	54.90	4
63.2	1 +	82.37	1	49.01	3	57.2	1 +
64.30	2	83.6	1 + br	55.85	1	58.90	3
64.85	1 +	86.59	2	60.21	1	59.77	1
66.34	2	90.59	3	61.98	4	61.79	1
66.45	1 +	98.0	1 + br	62.35	1	68.17	1 +
66.98	2 +	99.99	1	64.51	1	69.91	1
69.19	2	2903.35	1	72.13	1	74.27	1
75.2	2 + br	07.1	1 +	72.51	3	75.02	1
76.33	3	14.8	1 +	73.70	1	77.40	2
78.95	1	18.7	1 + br	79.54	1	82.28	1
80.0	1 + br	19.70	1	82.75	3	88.48	1
85.57	1 +	27.80	2	86.53	1	89.9	1 +
86.10	1 +	28.95	1 Mg?	86.91	3	92.35	1
89.67	1	29.66	1	87.93	1	93.29	1

3198.75	1	3354.53	4	3431.78	4	3517.65	1
3210.33	1	56.56	1	33.25	6	18.52	8
10.97	1	58.13	1 +	39.05	1	19.97	1
19.28	1	58.75	1	43.09	3	20.25	3
24.79	1	59.24	1 Ni?	43.35	1	21.75	5
33.05	2 Ni?	59.44	1	43.83	6	23.03	1
35.66	1	61.71	2 Ni?	46.23	1	23.62	5
37.15	1	62.95	2 Ni?	46.52	2	23.8	2
43.96	2	63.43	1	48.53	1	27.02	6
47.30	2	63.90	1	49.31	5	29.19	3
50.14	1	64.43	1	49.61	5	29.99	6
54.35	2	67.27	3	52.5	1 +	33.50	4
60.98	2	69.73	2	53.70	10	34.93	1
63.38	1	70.49	1	55.40	3	36.03	1
65.01	1	71.09	2	57.10	1	43.40	2
65.52	1	73.40	1	61.35	2	45.15	1
71.90	1	74.45	1 d?	63.01	5	46.85	1
76.58	1	76.4	1 +	66.00	5	48.37	1
77.43	1	77.20	1 +	69.17	1	48.56	1
77.77	1	78.53	1	71.55	2	50.75	3
78.95	1	78.91	1	74.24	8	52.86	1
79.36	1	81.63	1	74.71	1	53.15	2
83.60	3	85.39	4	76.52	1	56.1	1 +
87.81	1	87.83	3	78.01	1 Ni?	58.94	2
98.84	1	88.32	5	78.71	1	60.47	1
3307.30	2	90.56	1	78.90	1	61.06	4
08.63	1 +	90.93	1	80.20	1	61.3	2
08.93	1 +	95.56	5	83.60	3	62.26	1
12.31	1	99.0	1 +	85.53	3	63.07	1
14.21	2	3402.06	1	87.89	1	64.32	1
18.55	1 +	02.18	1	89.61	8	65.11	4
19.30	1 +	05.30	10	90.95	1	67.15	1
19.61	2	09.35	6	91.51	3	68.9	1 +
19.95	1	12.49	4	95.89	5	69.59	10
22.37	3	12.79	3	96.22	1	70.26	1
25.40	2	15.91	3	96.85	2	70.55	1 +
27.13	2	17.30	4	96.95	2 + (Mn)?	72.05	2 Ni?
28.35	1 +	17.81	1	97.47	1 +	75.14	4
33.53	1	17.90	1	3501.90	4	75.54	5
34.30	4	20.66	1	02.46	6	78.16	2
37.29	1	20.96	1	02.79	3	79.05	1
39.91	2	21.80	1	04.90	1	79.14	1
41.46	2	23.0	1 + Ni?	05.27	1	82.03	1
42.10	1 +	23.92	1	06.50	8	84.95	1
42.85	2	24.01	2	07.94	2	85.31	4
47.06	2	24.67	1	10.03	5	87.35	10
48.27	2	26.64	1	10.59	4	91.90	1
51.67	1	28.38	1 +	12.83	6	95.02	4
52.95	2	28.90	1 +	13.65	4	96.66	1

Co

Funkens

2.23	4	3702.44	6	3833.04	1 Ni?	3924.69	1
4.62	1	04.24	8	35.61	1	25.31	2
5.17	1	07.19	1	35.82	1	29.41	2 +
5.51	3	07.63	3	36.05	1	33.34	1 +
6.15	1 +	08.99	4	41.60	3	34.08	2
9.95	1	11.81	1	42.25	10	34.85	1
1.86	2	12.35	2	43.85	2	35.44	1
5.54	1	14.91	1	45.65	30	36.17	12
0.56	1	26.80	2	49.40	1 +	39.1	1 + br
1.38	4	29.00	2	50.25	1	40.02	1
4.50	1	30.64	5	51.10	2	41.05	4
5.10	1	31.45	1	52.00	2	41.89	4
7.94	4	32.59	8	56.91	2	42.85	1
1.56	3	33.65	6	58.43	3	45.1	1 +
2.99	2	34.30	3	61.35	10	45.50	5
4.85	2	36.08	4	63.75	2	46.80	2
6.85	1	40.35	2	66.96	1	47.30	2
7.45	1 +	45.65	10	69.4	1 +	51.91	1 +
9.57	2	50.10	4	70.70	3	52.47	2
9.90	2	51.74	3	73.30	15	53.12	6
3.31	2	52.91	2	74.14	15	56.44	1
5.31	1	54.48	3	77.01	5	57.80	1
5.54	1 +	54.85	4	78.90	2	58.10	4
7.20	1	55.59	4	82.04	6	58.75	1 +
7.79	2	59.85	2	84.75	3	61.15	3
7.23	1	60.55	2	85.40	2	65.39	1
7.45	2	74.75	3	90.25	1 + br	68.75	1 +
7.40	1	77.27	1	91.82	1	69.30	6
6.69	3	77.70	2	92.27	2	72.72	5 +
6.60	3	78.45	1 +	93.20	2 +	73.32	4
7.3	1 +	83.9	1 +	93.45	2 +	73.75	2 + Ni?
7.9	1 +	87.52	1 +	94.26	30	74.91	4
10.10	2	89.50	1 +	95.12	5	75.50	2
7.07	1	96.03	1 +	95.3	1 +	77.35	3
8.83	1	3801.41	2	98.63	2	78.80	3
7.34	5	05.94	2	3904.20	2 +	79.08	2 +
7.20	2	08.24	3	04.96	1 +	79.70	4
7.72	6	11.23	2	05.70	1 +	83.22	2
5.55	4	12.61	2	06.45	3	85.23	1
2.24	8	13.45	1	08.55	1 +	85.65	1 +
7.64	3	14.08	1 +	10.10	4	87.27	3
7.10	1	14.60	3	15.63	1	89.1	1 + br
7.64	1	16.43	3	17.26	4	89.85	1 +
9.90	3	16.56	4	19.78	1 +	90.50	3
3.30	4	16.63	3	20.30	2	91.82	8 + d
6.66	4	17.01	2	20.75	1 +	94.70	1
6.60	1	18.07	2	20.90	2	95.07	2 +
4.48	1	20.05	2	21.30	1 +	95.53	20
1.16	1	31.83	1	22.90	3	97.21	1

3998·10	10	4096·70	1 +	4285·94	1	4526·95	1 +
98·69	1	4104·56	1	87·50	1 +	28·1	1 +
99·4	1 + br	04·91	2	92·40	1	31·20	10 r
4002·02	1	06·56	1	98·13	1 +	33·40	2 +
03·75	2	08·55	1 +	4301·1	1 +	34·19	4
07·40	1	09·90	1 +	03·36	1	38·13	1 +
08·05	1 +	10·24	1	07·59	1	40·95	1 +
11·12	1 +	10·70	10	09·57	1 +	44·00	4
12·30	1 +	14·77	1	20·57	1 +	45·41	1
14·09	4	14·93	1 +	31·45	2 +	46·14	1 +
15·35	1	17·32	1 +	39·80	3	49·85	5
16·17	1 +	18·44	1	54·1	2 +	53·57	1
16·9	2 + br	18·94	20	57·07	1 +	59·49	1 +
18·24	1	21·51	20	59·67	1 +	62·13	1 +
19·43	2	22·43	1	61·05	1 +	64·2	1 +
21·06	5	23·02	1	66·31	2 +	64·4	1 +
23·55	3	23·35	1 +	71·30	2	65·02	1 +
25·60	1 +	25·55	1	73·79	2	65·83	8
27·16	3	39·60	2	75·13	2	66·81	1 +
35·69	3 +	45·31	3	75·72	2	69·48	2
37·36	1 +	50·64	1	79·45	1 +	70·20	2
39·14	1 +	58·60	2	80·25	2 +	74·45	1
40·2	1 +	60·86	8	88·06	1 +	79·53	1
40·97	1 +	62·37	3	91·76	2	80·35	1
44·0	1 +	71·10	1	92·08	2	81·82	10
45·54	5	79·41	2	96·07	2 +	88·90	1
48·37	1 +	87·45	2	4402·83	2 +	94·81	3
49·47	1 +	90·01	4 + (O)	05·10	1 +	97·09	3
53·09	3	90·90	3	14·09	4	4616·44	1
54·05	1	4207·75	1	17·57	2 +	23·23	1
57·10	2	08·75	1 +	21·54	2	25·92	2
57·35	2	15·05	1 +	31·77	1	29·54	5
58·35	3	20·50	1 +	45·25	1 +	44·50	1 +
58·76	3	25·32	1 +	45·93	1	57·60	1 +
61·91	1	34·20	1	67·10	3	63·62	5
63·34	1 +	38·20	1 +	69·77	5	82·55	4
66·52	5	42·12	1 +	71·73	2	93·40	3
68·69	5	44·42	2 +	71·98	1	98·57	2
76·74	1	45·72	1 +	78·49	1	4721·64	1 +
77·54	2	48·36	1	82·87	1 +	28·60	1 +
81·62	1 +	52·46	2	83·7	1 +	35·01	1 +
82·75	2	57·8	1 + br	84·11	1	37·92	1 +
84·29	1	63·90	1 +	86·93	1	46·2	1 +
85·77	1	68·63	1	94·91	1	49·90	4
86·49	8	69·59	1	97·56	1 +	54·61	2
88·45	1	72·42	1 +	4500·72	1 +	56·87	1 +
92·58	10	76·21	2 +	14·30	1 +	67·34	1
93·02	1	80·82	1 +	16·80	2 +	68·25	2
96·11	1	83·84	1 +	17·26	3	71·29	3

5.50	3	4840.49	10	5301.23	1 +	5470.70	1
3.40	1	43.70	1 +	31.7	1 + br	83.59	2
0.20	5	68.01	10	42.90	2 +	84.20	1 +
1.64	1	82.87	1	43.60	2 +	89.83	1 +
5.25	1 +	99.68	1	52.30	2	5523.49	1
3.09	8	4928.46	1 +	53.61	2	31.03	1
3.03	1	5146.91	1 +	59.40	1 +	90.95	1
7.99	1 +	5212.86	1 +	62.98	1	5647.45	1
3.70	10	30.35	1 +	69.83	1	6282.88	1
4.20	1 +	35.32	1 +	5444.76	1	6450.50	1
3.10	1 +	66.67	1 +	52.58	1	55.27	1
1.39	1 Ni?	80.80	1 +	54.82	1 +	6563.70	1

XVII. Cp. Cassiopeium.

Die Messungen: C. Auer von Welsbach, Sitzber. der Kais. Akad.

der Wiss. in Wien, 116, II b (1907).

Material: Nitrat von C. Auer von Welsbach.

Reinigungen: Ad.

Stückzahl: 236.

5.64	1	2672.74	1 Ad	2919.48	1 + Ad	3069.80	1 +
3.26	5	84.90	2	51.80	8	70.03	1 +
0.20	1	2701.81	5	53.93	1	70.57	1 +
2.13	2 (Fe)	22.25	1	55.92	3 + r	73.11	1
2.30	3	50.60	2 Ad	63.44	20	77.75	100
0.30	2 +	54.30	10	69.93	10	80.28	1 +
0.36	2 ¹⁾	72.70	50	89.37	2	81.60	3
1.85	3 + ¹⁾	75.50	1	95.99	1	83.42	1
5.93	1	88.38	1 +	3002.74	1 Ad	85.33	1 +
3.61	3	96.73	10	05.89	1 Ad	87.49	1
7.72	1 Ad	2818.89	1 Ad	16.5	2 + br, r	89.21	1 Ad
2.20	4	21.30	2 +	20.69	10	89.90	1 +
3.88	5	27.1	1 + br	27.41	1	90.49	1
2.20	2	34.50	3 + r ¹⁾	40.2	1 + br	91.49	1
3.41	20	47.61	10	55.80	1 +	92.63	1 Ad
3.50	5	58.44	1	56.88	15	94.00	1 + Ad
3.52	20	73.50	1	58.08	30 r	94.74	1
3.36	5	85.25	1 ¹⁾	62.35	1	95.47	1
2.67	1 Ad	91.52	1 Ad	65.14	1 + Ad	96.96	1
3.85	2 Ad	95.00	20	66.42	1 +	98.73	1
7.93	10	2900.48	10	67.85	1 +	99.55	1
3.20	1 Ad	11.59	50	68.06	1	3102.30	1
7.05	1 Ad	12.97	1 +	69.30	1 +	92.47	1

¹⁾ Gehört nach G. Urbain, C. R., 152 (1911) einem neuen Element Celtium (Ct) an.

3105.2	1+br, r	3174.63	1+	3472.62	30	4262.20
05.80	1	83.85	3	79.00	1 Ad	77.67
06.15	1	91.95	15 r	87.2	2+br	81.17
06.67	1	92.99	2 Ad	92.10	3+br	96.20
07.95	1+r, Ad	98.26	10	96.95	1+r	4342.21
09.45	1	3201.28	1+Ad	3507.56	20	4451.00
10.35	1	13.49	1	08.59	3	4515.33
12.24	1	17.30	1+Ad	20.43	1 Ad	18.71
13.48	1	22.75	2+br	49.98	1+Cp?	4645.70
14.90	1	43.15	1+br	54.58	50	48.4
16.81	1	46.15	1+br	67.99	5	58.20
17.34	1	49.60	2	96.52	1+	59.20
17.90	1 Ad	54.45	20	3602.07	1+	74.00
18.53	3 ¹⁾	59.20	1+Ad?	24.12	10	75.45
19.76	1	61.68	1 Ad	30.90	1	76.35
22.66	1	65.2	2+br	36.40	3	83.80
24.05	1	79.07	4	42.88	1+	4726.27
25.05	1	81.84	5	47.93	2	85.62
26.20	1+ Ad	86.17	1+	53.66	1	4839.65
27.80	1+	89.51	8 Ad	78.20	3+br	39.90
28.40	1+	3305.81	1+Ad	89.6	1+br	4905.05
30.44	2+	12.25	5	94.34	8 Ad	94.32
31.15	1+	20.46	1	3705.02	2+br	5001.30
33.34	1+	32.8	2+br	3821.00	2	5135.30
34.45	1+	59.71	5	41.35	2	5402.80
36.89	1+ Ad	75.61	1 Ad	76.81	10	76.89
39.25	1	76.63	5	3937.78	1+	5736.75
41.01	1+ Ad	80.41	1+	88.20	3 Ad	5983.91
45.18	1+ Ad	85.65	3	4054.62	2	84.31
47.55	1+	87.95	1+	4120.21	2+	6004.78
51.14	1	91.70	1+ ¹⁾	22.65	1+	6160.18
53.99	1 Ad	97.18	50	24.88	5	6222.10
67.50	3+br	3438.91	1+Ad	54.23	2	35.60
67.95	1+br	54.20	2 Ad?	71.90	1	42.60
69.75	1	58.41	1 Ad	81.01	1 Ad	6462.86
71.49	3 ¹⁾	64.51	2 Ad?	84.41	20	63.38

Kanten.

4661.95	K. R.	4684.40	K. R.	4695.70	K. R.	4708.20
72.5	K. R.					

¹⁾ Gehört nach G. Urbain, C. R., 152 (1911) einem neuen Element Celti

XVIII. Cr. Chrom.

Ältere Messungen: W. E. Adeney, Roy. Dubl. Soc. (1904). F. L. Cooper, Astroph. Journ., 29 (1909).

Material: Metall von C. Schuchardt.

Verunreinigungen: C, Ca, Cu, Fe, Mg, Mn, Sr.

Linienzahl: 1806.

2132.75	1	2256.15	2	2366.89	2	2465.73	1 +
33.57	1	56.76	1	81.59	2	65.87	1 +
34.65	1	57.55	1	89.86	2	66.33	1 +
35.49	1	57.70	1	94.10	2	66.7	2 + br
41.29	1	57.90	1	97.85	2	69.22	2
44.30	1	58.15	2	98.6	1 +	69.60	1 +
50.82	1	58.25	1	99.75	1	70.95	1 +
70.78	1	58.75	1	2400.32	1 +	72.96	2
71.20	1	61.83	1	04.05	1 + br	75.03	1 +
83.80	1	65.02	1	08.76	1 +	75.78	1
85.10	1	73.50	2	13.73	1 +	77.03	1
90.90	1	75.60	2	16.48	2	77.85	1 +
91.71	1	76.56	2	19.50	1 +	78.70	2 r (C)
98.01	1	77.58	1	19.98	1	79.90	2
98.70	1	84.58	2	20.20	1	83.18	3
2203.32	1	87.30	1	25.30	1 +	83.90	3
08.79	1	89.31	1	25.75	1	85.60	1 +
11.90	1	90.76	2	28.45	1	86.42	2
13.79	1	95.64	2	29.75	1 +	86.76	1
17.59	1	97.27	2	30.20	1 +	87.18	1 +
18.75	1	2300.59	2	33.31	2	89.41	2
19.70	1	06.94	1	35.40	1 +	89.9	1 + d
26.78	2	07.28	2	38.55	2	90.21	1
31.90	1	10.10	1	45.18	1 +	90.9	2 + br
33.87	1	14.73	2	45.65	1 +	92.75	2
35.97	2	14.82	2	46.15	1 +	92.99	2
37.65	2	19.15	2	46.97	1	93.39	2
41.43	1	19.49	2	49.70	2	96.5	1 + br
41.90	1	20.20	2	50.03	2	97.0	1 + br
43.39	1	24.99	4	50.45	1	97.98	1
43.74	1	30.1	1 +	52.80	1	98.94	2
44.21	2	33.56	2	54.14	1	2501.60	1
44.97	1	33.97	1	54.55	2	04.43	1
47.81	1	34.33	1	55.3	1 + br	05.94	1
48.00	1	34.50	1	56.9	1 + br	06.19	1
48.41	1	34.62	1	58.90	1 +	06.49	1
48.69	1	37.82	1	59.05	1 +	10.35	1
49.95	1	40.55	1	60.54	1	11.31	1
50.10	1 +	44.66	1	60.95	1 +	12.10	1
51.62	2	45.41	3	62.44	1	12.52	1 +
52.14	1	65.29	2	65.02	1	13.82	3 +

2515·20	3 +	2567·7	1 + br	2618·85	1 +	2676·68
16·00	1 +	68·70	2 +	19·73	2 +	77·27
16·72	2 +	69·57	1 +	20·63	2 +	78·88
18·41	3 +	70·94	1 +	23·48	2 +	80·01
19·65	1 +	71·89	2	26·15	1	80·40
20·75	2	72·24	1	26·89	2	83·55
22·8	1 +	73·66	2	28·10	2 +	84·22
23·40	4	74·29	1	31·10	3	85·16
23·75	2 +	75·90	1	32·7	1 + br	85·25
27·20	1	77·80	1	33·75	1 + br	86·10
27·52	1	78·40	2	34·45	1 + br	86·49
30·06	4	79·21	1	35·9	1 + br	87·18
30·30	2 +	82·21	1	36·45	1	88·40
31·10	2	82·35	1 +	37·29	1	89·28
31·94	1	83·73	1	37·60	1	89·90
34·42	2	84·20	2	39·25	1 + br	90·5
36·90	1	85·02	1 +	40·1	1 + br	91·15
37·81	1	85·71	1 +	40·83	1	92·22
38·42	5 +	87·50	2	41·52	1	93·62
39·05	1	88·1	1 +	41·95	1	94·8
42·88	1 +	88·3	1 +	43·67	1	96·86
43·23	2	89·15	1	47·6	1 +	97·60
44·41	1	89·80	2	48·24	1 +	98·01
45·29	1	90·55	1 +	50·95	1 +	98·52
46·07	1 +	90·87	3	52·2	2 + br	98·76
46·55	1	91·95	1	53·69	5	98·94
47·65	1 + br	95·67	2	55·90	1 +	99·50
48·15	2	96·20	2 +	57·7	1 + br	2700·72
48·67	3	2601·98	1	58·70	4	01·21
50·14	1 +	03·05	1 + br	59·05	2	01·30
50·42	1 +	03·82	1	59·59	1	01·78
51·70	3	04·25	1	59·89	1 +	02·11
52·00	1	05·73	1	60·9	1 +	02·66
55·65	2 +	06·17	1	61·49	3 +	03·08
57·15	1 +	06·64	2	61·85	3 d?	03·64
57·57	1	07·73	1	63·15	1 +	03·95
58·5	1 +	08·00	2	63·59	5	04·88
59·92	2 +	08·25	1 +	63·8	3 +	05·54
60·81	1	08·91	1	65·8	2 + br	06·22
61·13	1	10·2	1 +	66·19	8	06·65
61·95	1 +	10·93	2 + br	68·07	2 +	08·90
62·6	2 +	11·1	1 + br	68·83	6	09·41
63·45	2	11·70	1	70·21	3	11·01
63·70	3	12·65	1 +	70·40	2	11·3
64·87	1	13·31	1 +	71·95	8	12·41
66·45	1 +	13·62	1	72·50	2	15·75
66·6	1 +	14·72	2 +	72·94	6	17·10
66·99	1	16·30	2 +	75·40	1 +	17·59
67·47	1 +	16·55	1 +	75·79	3	18·2

2718.48	8	2760.4	2 +	2803.45	1	2853.35	3
19.15	1	60.49	2	04.15	1 +	53.95	1
20.17	3	60.61	2	08.14	2	54.28	1
20.37	2	60.96	1	09.4	1 + br	54.72	1
20.79	1	61.85	1 +	09.72	1	55.15	2
22.83	5	62.70	10	10.25	2 + br	55.75	10
23.69	5 d	62.85	2 +	11.0	1 +	56.42	1
24.12	4	63.70	2	11.18	2	56.86	3
26.33	1	64.10	1	11.57	1	57.50	3
26.59	1 +	64.40	2	12.12	10	58.07	2
27.32	5	65.15	1 +	13.64	1	58.75	2
28.25	1	65.59	2	14.35	1	59.02	4
29.83	1	65.70	1	16.92	3	61.05	5
31.99	1	66.00	2	17.67	1	62.69	10
33.69	1	66.62	15	18.07	1	65.22	4
34.66	1	67.35	1	18.48	8	65.46	2
35.83	1	67.69	1 d	22.18	5	65.81	1
37.14	1 +	68.25	1	22.53	10	66.03	2
39.5	2 +	68.68	4	24.69	1	66.85	5
39.84	1	69.45	1 +	25.65	2	67.24	2
40.17	3	69.98	1 +	26.2	1 +	67.75	5
41.16	2	71.40	1	26.29	2	68.75	1 +
42.12	8 r	72.03	2 +	26.55	1	70.54	5
43.70	8	72.47	1 +	28.07	1	71.56	1
44.66	2	73.42	3	28.90	1	71.74	1
45.04	3	74.56	4	30.63	20	73.60	3
45.48	1	76.75	2	32.59	4	73.96	2
46.26	4	78.17	5	33.53	1	74.63	1
47.95	1 +	79.05	1	34.40	5	75.14	2
49.02	8	80.42	5	35.71	30	76.06	5
49.88	2	81.02	2	36.59	2	76.39	3
50.81	10	81.20	2	38.00	2	76.76	1 +
51.96	10	82.48	3	38.90	5	78.06	3
52.49	1	82.70	2	39.34	1	78.54	2
52.90	1 +	83.96	1	40.14	8	79.31	1
53.28	1	84.45	1 +	40.57	1	80.99	4
53.75	2	85.25	1	42.52	1	82.01	4
54.00	2	85.82	8	42.90	1	85.42	1
54.39	3	86.58	3	43.35	15 u	86.53	1
55.11	1	87.71	4	46.50	3	87.11	1
55.35	2	88.00	1	46.80	2	87.88	2
56.39	3	89.19	1	48.51	2	88.85	3
57.04	2	89.51	4	49.46	1	89.30	3
57.81	8	92.26	10	49.94	10	89.62	3
58.73	1	93.77	1	50.45	1 +	89.96	2
59.08	4	95.65	2	50.74	1	91.24	4 d
59.50	4	98.81	3 d	51.49	8	91.53	1
59.83	3	2800.30	2	52.39	1	91.99	2
60.15	2	00.89	10	52.80	1	92.89	1

2893.08	2	2939.57	2	2996.74	2	3057.98	1
93.37	1	40.36	2	98.94	1	58.47	1
93.63	1	41.09	1	99.45	1	59.61	2
94.38	2	42.09	3	3000.10	1	61.73	1
94.95	1	45.85	1	01.04	1	63.42	1
95.14	1	46.92	3	04.04	2	63.95	1
95.79	1	47.59	1	05.19	2	65.19	1
96.52	5 d	49.55	2	10.76	1	67.28	2
96.88	2	49.91	1	11.55	1	71.70	1
97.36	1	50.22	1	13.15	1	72.57	1
97.81	3	50.80	1	13.84	2	73.37	1
98.65	5	51.53	1	14.90	1	73.80	1
99.26	2	52.08	1	15.08	1	77.34	2
99.59	3	52.56	1	15.33	1	77.90	2
2901.15	1	53.47	3	15.62	3	79.45	1
02.77	1	53.81	4	17.71	2	83.75	1
03.01	1	54.77	1	18.64	1	84.56	1
03.72	1	55.25	1	18.95	1	85.49	1
04.09	2	56.73	1	20.81	1	88.00	2
04.84	1	57.7	1	21.73	2	93.61	3
05.61	1	59.70	1	24.52	2	94.11	1
06.28	1	60.07	1	26.81	8	95.07	1
08.42	1	61.85	4	28.23	3	95.63	1
09.17	1	63.60	1	29.27	1	96.25	3
10.78	2	66.17	3	30.36	2	98.27	1
11.01	1	67.04	1	31.47	1	3103.60	2
11.28	1	67.76	1	33.05	2	07.70	3
11.82	3	68.83	1	34.3	1	08.79	2
13.66	1	69.79	1	34.64	1	09.48	1
13.84	1	71.25	1	35.1	1	11.0	1
15.35	2	72.02	10	37.16	1	12.07	1
16.19	1	75.61	1	38.15	1	13.76	1
21.35	3	76.83	2	39.85	1	15.40	2
21.94	3	79.88	10	40.30	1	15.76	2
22.61	1	80.95	1	41.03	10	16.85	2
23.60	2	84.86	1	41.86	5	17.39	1
23.85	3	85.48	10	42.90	1	18.24	1
26.28	2	86.1	2	44.01	1	18.80	10
27.20	5	86.61	2	44.34	1	20.50	15
28.27	3	87.05	1	47.74	1	21.17	1
28.45	3	88.19	2	47.86	1	21.33	1
29.55	2	88.80	1	50.27	10	21.96	1
30.96	2	89.33	10	50.85	1	22.72	3
32.82	2	92.06	1	51.7	1	25.11	20
33.74	1	92.60	2	52.35	1	25.67	1
34.07	2	92.7	1	53.85	1	28.79	5
34.4	2	94.23	1	54.02	2	30.66	1
35.25	4	94.89	2	55.55	1	32.20	20
37.05	2	95.26	1	56.8	1	34.45	3

3135.46	3	3208.13	1	3291.90	3	3358.63	10	
35.82	3	08.73	2	95.1	1+	60.50	20+	
36.79	5	09.31	10	95.61	5	61.96	4	
37.23	1+	11.48	1	98.47	1	63.87	2	
37.60	1+	11.62	1	98.89	1	64.85	1+	
38.3	1+	12.65	1	3301.37	1	67.59	2	
40.02	1+	13.05	1	03.06	1	68.19	20	
40.31	3	16.70	3	04.93	1	68.89	1	
42.84	1	17.60	8	07.21	8	69.20	2	
43.0	1+	19.29	2	07.95	1 Cu?	71.60	1+	
45.20	2	19.80	1	08.34	1	72.27	2	
45.86	2	19.95	1	10.02	1	75.11	1	
47.30	5	25.55	1	10.86	4	76.43	1+	
48.55	1	29.37	1	12.10	3	76.85	1+	
49.93	2	29.50	1	12.37	3	77.50	1+	
50.22	2	30.04	1	13.26	2	78.51	5	
52.31	3	31.80	1	14.23	2	79.54	3	
54.20	1+	34.20	6	14.77	3	80.02	5 r	
55.25	1	37.89	1	15.45	1	82.82	10	
58.15	2	38.24	1	16.65	1	85.49	1	
59.05	1+	38.92	6	22.86	1	86.66	1	
59.23	1+	45.70	1	23.70	1	87.85	1	
60.0	1+	49.70	1+	24.22	3	88.13	1	
60.25	1+	50.8	1+	24.47	4	88.90	1	
62.59	1	50.98	1	26.75	1	90.95	1	
63.93	1	51.76	1	28.50	3	91.61	5	
64.05	1+	52.04	1	29.16	1	93.20	5	
69.35	2	52.65	1	29.60	1	94.02	4	
72.21	3	55.54	1	33.05	1+	94.51	4	
73.70	1	57.95	1	35.51	8 d?	95.77	3	
78.94	1+	58.90	2	36.49	5	99.69	2	
79.53	2+	br	60.10	1	37.11	1	3402.60	4
80.88	10	64.42	3	39.1	1+ br	03.49	15+	
81.60	2	66.43	1	40.00	10	05.4	1+ br	
83.48	4	68.65	1	40.88	1	08.90	20+	
84.50	1	69.30	2	42.16	1	10.71	1	
86.88	1	69.95	2	42.78	10	11.16	1+	
88.15	1+	70.35	3	43.46	1	12.35	1+	
90.00	1	71.25	1	44.65	1	15.60	1+	
94.1	1+	73.05	1+	46.15	1	17.93	1+(Fe)	
94.77	1	74.13	1	46.86	1	19.44	1+	
97.21	15	76.06	1	47.99	6	21.33	10	
98.15	1+	78.92	1	49.2	1+	21.77	1+	
3200.01	1	79.67	1	49.50	2	22.89	20+	
00.57	1+	83.19	2	51.77	1	24.78	1	
01.40	2	86.06	2	52.12	1	26.26	1	
02.65	1	86.45	1	53.27	3	27.24	1	
03.66	1	88.15	1	55.3	1+	27.75	1	
05.24	2	91.40	1	57.54	4	28.05	1	

Funken

Cr

3430.02	1	3471.66	1	3564.45	1	3651.84
30.57	1	72.23	3	64.88	1	54.10
31.42	1	72.96	1	66.25	2 + br	56.43
31.80	1 +	73.05	1	69.30	1 +	58.34
32.15	1	73.77	1	72.90	1	63.03
32.48	1	74.54	1	73.80	1	63.42
33.45	5	75.28	3	74.21	1	65.10
33.73	2	77.33	1 +	74.96	3 +	66.15
34.23	2	78.30	1	78.81	20 u ¹⁾	66.83
35.82	1	78.90	1	82.79	1	68.20
35.93	1	80.45	1 +	84.5	2 + br	76.49
36.31	2	81.45	2	85.44	4	77.86
36.88	1	81.70	2	85.64	3 +	78.04
38.57	1	82.75	2	93.63	20 u ¹⁾	79.21
40.73	1 (Fe)	83.65	1	94.50	1	80.03
41.24	1	84.29	3	99.54	1	81.86
41.57	2	86.64	1	3601.81	3	84.41
43.94	1	88.58	1	02.74	1	85.74
44.50	1	94.68	1	03.92	10	86.88
45.74	2	95.11	1	05.48	20	87.65
47.15	1	95.53	3	08.55	1	88.60
47.57	2	95.68	2 +	09.65	1	89.48
47.90	1	3502.45	1	10.22	1	89.76
49.4	1 +	03.51	1	12.79	1	93.26
51.00	1	08.24	1 +	13.37	3	95.2
53.47	2	10.69	1	13.84	1	96.05
53.88	1	12.00	4	15.80	1	96.96
55.11	3	13.20	1	17.45	1 +	98.16
55.4	1 +	18.80	1	19.61	1	3711.44
55.74	2	22.30	1	21.65	1	13.12
57.78	4	23.1	1 +	26.45	1 +	15.33
58.25	1	27.24	1 +	31.76	10 d?	15.58
59.43	3	31.57	1 +	33.00	2	16.66
60.58	1	33.02	1	34.15	1	23.54
61.45	1 +	36.65	1 + br	35.16	1	27.49
62.88	1	39.12	1 +	36.75	3	30.95
63.73	1 +	47.22	1 +	39.98	5	32.19
64.16	1	48.9	1 + br	41.64	1	37.70
64.97	1	50.78	2	42.01	3	38.53
65.37	1	52.8	2 + br	43.35	1	43.14
65.70	1	54.11	1	44.84	1	43.71
66.4	1 +	56.25	1	46.30	1	44.06
67.15	1	58.8	2 + br	47.52	1	44.64
67.85	1	59.94	1	48.68	1	47.44
68.90	1	62.46	1	49.19	3	48.80
69.75	1	62.6	1 +	49.98	1 +	49.16
70.6	1 +	64.09	1	50.54	3	50.71

¹⁾ Rote Komponente stärker.

3754.75	2	3849.64	2	3928.80	3	4026.31	2
57.34	1	50.20	2 r	36.27	1 +	27.25	2
57.83	2	52.37	1	37.75	1 +	30.86	2
58.20	1	52.74	1	38.5	1 + br	31.32	1 +
61.85	1 +	53.36	1	41.33	1	33.46	1
62.0	1 +	54.40	2	41.66	3	37.45	1
65.75	1	55.0	1 + br	43.78	1 +	38.19	2 +
67.58	1	55.45	1	45.25	1 +	39.25	3
68.40	2	55.75	1	45.65	1	43.87	1 +
68.86	1	56.47	1	46.13	1	48.93	2
78.86	1 +	57.80	2	49.00	1	49.3	1 + br
83.95	1 + br	62.72	1 +	49.8	1 +	49.93	1
89.03	1	65.80	1	51.25	1 +	51.52	1
89.90	1 +	66.71	1	51.95	1 +	52.15	1 +
90.39	1	68.44	1	52.53	1	54.27	1 +
90.64	1	70.4	1 + br	53.30	1	56.23	1 +
91.55	2	71.6	1 + br	58.22	1	56.96	1 +
92.31	2	72.70	1 (Fe)?	60.91	1	58.96	3
93.46	2	74.73	1 +	63.88	8	60.82	1 +
94.05	2	75.4	1 + br	69.21	2	64.76	1 +
94.79	1	79.41	1	69.92	8	65.88	2
95.20	1 (Fe)	81.45	1 +	71.42	1 (Fe)	67.10	2
97.32	1	82.05	1	72.87	1	68.01	1
97.90	2	83.48	3	76.83	8	71.11	2 +
3801.4	1 + br	83.85	1	78.82	1	75.05	1
05.00	3	85.39	3	79.66	2	76.12	4 +
07.01	1	86.97	3	79.94	1 +	77.25	1
08.10	1	91.01	1 +	81.40	1	80.45	1 +
09.68	1	92.12	1 +	83.42	1 +	81.95	1 +
12.45	1	94.21	3	84.09	5	82.53	1 +
14.17	1 +	97.82	1 +	84.51	2	86.34	1 +
14.79	1	3902.25	1 +	90.15	3	90.55	1 + br
15.60	2	03.09	3	91.30	4	92.40	1
16.35	2	03.33	1	91.84	2	93.30	1 + br
18.00	1	05.81	2	93.02	3	98.63	1
18.64	1	07.50	1 +	94.14	1	99.20	1
19.75	2	07.93	1	99.03	1	99.62	1
21.07	1 +	08.91	3	99.85	1	4100.01	1
21.75	1 +	11.53	1	4001.61	2	01.34	1
23.67	1	14.52	1	02.68	1 +	05.05	2
25.56	1	15.72	1	03.48	2 +	08.57	1
26.56	2	16.04	1	04.07	1 +	09.75	1
30.19	2 +	16.41	2	12.67	3	11.19	2
31.20	1	17.18	1 +	14.83	1	13.44	1 +
34.91	1 +	17.78	1	16.99	1 +	20.79	1
36.24	1	19.36	5	18.37	1 +	21.45	1
41.46	3	20.3	1 +	22.43	2	22.01	1
49.15	2	21.20	3	23.88	1	22.36	1
49.52	2	26.83	1	25.17	1	23.65	2

5255.20	2	5313.07	1	5391.53	1	5649.58	
61.90	1 +	13.80	1	5400.80	2 (Fe)	64.26	
64.32	3	18.95	1	05.21	1	81.4	
65.30	1	28.52	10 +	07.80	1 +	82.6	
65.90	2	29.30	1 +	10.04	8	83.7	
72.20	1 +	30.0	1 + br	21.15	1	94.95	
75.3	2 + br	35.09	1	42.62	1	98.56	
75.7	1 + br	38.00	1	64.15	1	5702.55	
76.1	1 + br	40.66	1	78.58	1	13.00	
96.86	3	45.00	1	80.81	1	83.38	
97.50	2 +	46.00	5	5502.30	1	84.15	
98.2	1 + br	48.50	3	03.40	1	85.23	
98.43	4	68.71	1	08.83	1	86.04	
5300.90	2	70.51	1	10.93	1	88.20	
04.33	1	73.88	1	5620.9	1 + br	91.26	
06.03	1	87.16	1	28.88	2	6330.30	
08.60	1	87.77	1	42.60	1 +	63.0	
10.92	1 +	90.60	1				

XIX. Cs. Caesium.

Ältere Messungen: Fehlen.

Material: Caesiumchlorid von E. Merck, auf Gaskohle.

Verunreinigungen: Ba, Ca, Sr.

Linienzahl: 66.

2267.70	2 +	2525.84	1	9149.52	1 +	4265.7	
73.91	1 +	44.05	4 +	52.58	1 +	77.28	
85.49	1 +	73.21	1	3268.45	2 +	4364.5	
86.24	1 +	97.02	2 +	3315.7	1 + br	73.20	
2315.8	1 + br	2600.45	1 +	49.61	1 +	4406.5	
17.03	1	09.57	1 + br	3559.9	1 +	4501.80	
32.54	3 +	10.24	1 + br	97.60	2 +	26.90	
40.65	1 +	30.67	3	3608.41	1 +	40.2	
75.9	1 + br	2700.7	1 + br	61.52	1 +	55.49	
79.3	1 + br	01.31	1	3806.0	1 + br	93.40	
93.00	3	2811.00	1 +	61.6	2 + br	4603.99	
2425.28	2 +	17.05	1 +	98.0	1 + br	5831.7	
26.5	1 + br	46.1	1 + br	3925.85	1 +	5926.2	
27.83	1 +	59.50	2	59.77	1 +	6010.5	
55.97	1	2931.15	1 + br	4006.7	1 + br	6213.5	
77.71	1	77.02	1 +	41.0	5 + br	6723.5	
85.59	1	3066.8	1 +				

XX. Cu. Kupfer.

Ältere Messungen: J. M. Eder und E. Valenta, Denkschr. der K. Akad. der Wiss. in Wien, 63 (1896); Sitzber. der K. Akad. der Wiss. in Wien, 118, II a (1909) (Rot).

Material: Elektrolytisch gereinigtes Metall von Dr. E. Murmann, Wien.

Verunreinigungen: Ag, Ca, Zn.

Linienzahl: 328.

2104·89	1 +	2264·00	3 +	2458·73	1 +	2641·65	1 +
12·19	2 +	65·55	2 +	59·45	1 +	44·00	1
17·46	2 +	76·36	4	66·00	1 +	66·52	3 +
23·08	2 +	86·80	2	68·67	2 +	89·56	8
25·28	1 +	91·20	2	73·55	4 +	2701·21	8
26·12	2 +	92·79	1	82·43	2	03·42	5
34·49	2 +	94·45	4	85·99	5 +	13·76	8
36·08	3 u	2309·71	1 +	86·60	1 +	19·02	6
47·10	1 +	23·20	1 +	89·70	5	21·93	2 + (Ag?)
49·08	2 +	36·30	2	92·24	2	37·6	1 +
51·99	1 +	46·22	1	96·20	1 +	40·0	1 +
61·49	2 +	48·86	2	97·70	1	45·52	2 +
65·14	1 +	55·19	2	2506·51	10 r	66·53	2
75·13	2 +	56·67	3	08·7	1 +	69·95	10
79·49	3 +	61·67	1 +	11·50	1 +	2813·10	1
82·88	1 +	63·3	1 +	16·5	1 + br	24·49	4
89·69	3 +	64·3	1 +	17·05	1 + br	37·68	3 +
92·35	3 +	67·55	1 +	18·55	1 + br	58·0	1 + br
95·87	2 +	68·20	1	19·0	1 + br	58·4	1 + br
99·71	1 + u	69·94	10	21·15	1 + br	77·97	3 +
2201·65	1 +	70·93	1 +	22·45	1	83·05	2
09·94	1 +	72·34	1 +	23·25	1 + br	84·48	2 +
10·35	3 +	76·43	2 +	25·1	1 + br	2961·30	4
12·95	1 +	85·10	1 +	26·79	4	78·41	1 + br
15·28	2 +	91·81	1	29·50	8	79·50	1 +
18·19	3 +	92·72	1 +	32·2	1 + br	97·50	3
18·7	1 + br	2400·18	6	32·95	1 + br	3010·95	3
24·95	2 +	03·51	6 +	35·4	1 + Ag?	21·70	1 +
25·80	1 +	05·54	1	38·8	1 +	22·71	1 +
26·95	2 +	12·18	1	45·02	20	36·20	2
27·89	1 + u	12·39	1	53·33	1 +	63·55	3
28·94	3 +	24·62	2 +	66·50	1 +	73·95	2
30·19	2 + u	29·10	1 +	71·99	1 +	88·20	1 +
31·10	1 +	30·5	1 +	73·50	1 +	94·11	2
31·74	1 +	35·95	1 +	90·75	3 +	3100·04	5 +
42·69	6 +	41·70	2	99·03	3 +	08·75	6 +
47·06	8 u	43·47	1 +	2600·49	5 +	16·45	2 +
49·12	2 +	44·50	2	09·39	2	26·22	3 +
55·13	2 +	46·9	1 +	18·50	3 r	28·80	2 +
63·40	2 +	53·13	1 +	20·87	1 +	40·50	2 +

3142.56	2 +	3450.50	8 +	3777.2	1 +	4932.6	
46.95	2 +	54.89	5 +	91.2	2 +	54.9	
56.77	1	57.99	2	3800.60	1	74.7	
69.77	2 +	65.6	1 + br	09.30	1 +	86.5	
70.7	2 + br	72.25	1	09.75	1 +	5013.5	
94.22	3	76.13	3	60.65	1 +	16.8	
3208.32	2	83.90	5	4003.20	1 +	34.5	
23.50	2 +	87.70	1 +	22.85	20 r	52.9	
24.75	2 +	88.98	1 +	43.62	4	67.0	
26.71	1 +	3512.25	5 +	62.87	10 +	76.4	
31.25	3 +	17.1	1 +	80.7	1 +	89.5	
35.80	3 +	20.13	2	4123.50	2 +	5105.7	
43.27	5 + br	24.39	3	78.0	2 +	12.1	
47.66	30 +	27.60	1 +	4228.10	2	24.7	
52.40	1	30.53	3	49.15	5 r	44.4	
66.15	2	33.88	2 +	59.65	2 +	53.4	
68.40	2	45.0	1 +	75.30	20 r	5201.2	
74.08	30 +	99.27	3 +	4378.34	20 +	18.7	
77.42	1	3602.17	3 +	4415.7	2 +	20.2	
79.92	3	13.90	2 +	80.61	2	50.1	
82.80	8 +	14.30	1	4506.16	2	92.1	
90.67	8 +	20.60	1 +	09.53	3 r	5352.9	
93.05	2	21.3	2 +	31.02	2	55.3	
3308.07	10 +	24.4	1 +	39.9	5 +	60.3	
17.30	3 +	27.4	2 +	87.2	20 +	91.8	
19.78	2 +	36.05	2 +	4651.38	10 + r	5408.8	
29.73	2 + br	41.82	1 +	67.4	1 +	32.1	
35.36	2 + br	45.3	1 +	75.00	3 +	63.1	
37.97	3	48.50	1 +	97.75	1 + br	78.1	
49.40	3 +	56.00	1	4704.79	2	5535.1	
54.63	1 +	59.5	1 +	58.60	2	40.1	
65.51	3 +	65.89	1	67.5	1 + br	43.1	
75.81	1 +	72.10	1 +	97.30	1 +	55.1	
81.3	1 + br	77.0	1 +	4814.0	1 + br	74.1	
81.54	1	84.8	1 +	32.42	1	5609.1	
95.59	1 +	86.69	3	42.5	1 + br	35.1	
96.47	1 +	3700.65	1 +	52.0	1 + br	52.1	
3402.4	2 + br	34.28	1	56.5	1 + br	5700.1	
04.8	2 +	41.40	1	66.8	1 + br	10.1	
15.9	3 +	52.5	1 +	71.5	1 +	22.1	
20.30	1 +	59.6	1 +	4910.5	2 + br	32.1	
22.2	1 + br	72.02	1 +	19.3	1 + br	82.1	

XXI. Dy. Dysprosium.

Ältere Messungen: Fehlen.

Material: Dysprosiumnitrat von C. Auer von Welsbach.

Verunreinigungen: Nh?

Linienzahl: 1464.

80	1 +	2986.04	1	3081.01	1	3139.60	1
16	2	90.63	1	81.70	1 +	40.73	2
71	1 +	91.48	1	82.63	1	41.21	2
95	1 +	91.73	1 +	84.76	1 +	42.39	1
50	1 +	3002.55	1 +	85.30	1 +	43.30	1
11	1	02.80	1 +	87.50	1 +	43.93	1
68	1 +	03.85	1	89.88	1 +	45.30	1
89	1	04.30	1 +	93.20	1	46.25	1
62	1	05.02	1	93.95	1	47.00	1 +
44	1 +	15.19	1	94.70	1 +	47.61	1
63	1 +	15.79	1	95.17	1 +	50.00	1
50	1 +	17.05	1	95.46	1 +	50.25	1
52	1 +	26.26	1	95.84	1 +	52.00	1
49	2	27.68	1 +	96.96	1	52.39	1 + br
68	1 +	29.95	1	98.67	1	53.40	1
24	2	30.50	1	3101.01	1	54.3	1 + br
07	1 +	31.28	1 +	02.02	2	54.7	1 + br
33	1 +	33.30	1	02.30	1 + d	56.60	3
80	1 +	36.83	1	03.36	1	57.30	1 +
00	1 +	38.40	2	03.95	1	57.64	1 +
83	1 +	43.27	2	05.13	1	60.61	1
82	1	43.56	1	05.79	1	61.12	1
16	1 +	44.69	1	06.15	1	62.94	3
40	1	49.23	1	07.13	1	64.16	1
90	1 +	51.56	1 +	09.44	1	67.56	1
60	1	52.44	1	09.89	2	67.93	1 +
12	1 +	57.05	1	10.40	1 +	68.20	1 +
86	1	59.56	1	10.88	1 +	68.70	1 +
10	1	60.12	1	12.23	1 +	69.67	1 +
11	1	60.75	2	13.22	1 +	70.10	2
50	1	61.50	2 +	13.51	1	70.85	1
06	1	62.29	1	14.90	1	71.60	1
76	1	62.70	2	17.00	1	75.01	1
06	1	63.85	1	17.63	1	77.66	1
95	1 +	65.25	1 +	18.05	1 +	78.01	2
49	1 +	67.09	1	20.30	2	78.50	1
65	1	69.03	1	22.15	1 +	80.80	1
30	1 +	69.80	1	22.63	1 +	82.05	1 +
17	1	70.55	1	23.10	1 +	83.30	1
55	1 +	72.00	1	24.99	1	84.35	1
25	1 +	72.50	1 +	26.26	1 +	84.90	1
40	1	73.02	1 +	26.86	1	86.50	2
19	1	73.65	2	27.53	1 +	87.80	2
83	1	75.25	1 + d	28.48	2	88.80	1
49	1	75.58	1	30.30	1 +	89.18	1
86	1	75.95	1 +	32.21	1	89.90	1
75	1 +	78.44	1	32.70	1 +	90.27	1 +
49	1 +	79.45	1	33.13	1	93.10	1
77	1	80.37	1 +	35.49	3	93.41	1

3193.99	1 +	3257.47	1 +	3311.09	2	3353.7
96.55	1	60.13	1	12.45	1	55.1
97.71	1	60.80	1	12.82	2	55.7
99.33	1	61.35	1	13.46	2 +	56.3
3201.44	1 +	62.12	1 +	15.08	1	57.3
01.75	1 +	64.85	1 +	16.40	2	57.4
02.72	1 +	65.30	1 +	17.22	2	57.7
02.95	1 +	65.70	1 +	18.25	1	58.0
04.49	1	66.12	2	18.56	1	58.4
05.60	1	66.35	2	18.86	1	58.7
06.51	1	69.25	1	19.99	3	59.1
06.80	1 +	69.70	1	22.00	1	59.6
07.24	1	72.20	1	23.10	1	60.7
08.47	1 +	72.81	2	24.36	1	61.3
08.96	1	75.11	1	26.31	2	62.3
12.20	1	76.05	1	26.60	2	63.5
12.57	1	76.90	1	27.20	1 +	64.5
12.81	1	78.50	1	27.46	1 +	65.2
14.78	1	79.60	1	30.41	1	65.9
15.32	2	79.85	1	30.73	1	66.3
16.76	3	80.22	2	31.36	1	67.3
17.50	1	81.80	1 +	33.22	1	67.70
20.60	1	82.91	3	33.70	1	68.2
21.63	2	84.49	1	34.30	1	68.75
23.42	2	85.10	1	34.60	1	69.47
25.25	1	88.10	2	34.98	1	69.7
26.10	2 d	88.80	1	35.60	1 + br, d	70.26
26.50	1	89.50	2 +	36.00	1 + -	70.61
27.85	1 +	91.20	2	36.99	1	71.01
29.10	1	94.00	1	37.30	1	71.89
29.50	1	94.79	1	37.47	1 +	73.82
30.09	1	95.10	1	38.40	1 +	74.42
32.26	1 +	95.35	1 +	39.61	2	75.87
32.76	1	96.08	1	41.10	2	76.15
34.65	1	96.48	2	41.58	1 +	76.49
36.00	3	97.78	2	42.77	1	76.80
36.75	2	99.30	1 +	44.60	1	77.28
40.97	2 +	3301.05	1	45.46	1	78.35
42.10	1	02.25	1	45.89	1	78.59
43.88	1 +	02.65	1	46.80	1	79.05
45.24	2	03.30	1 +	47.92	4 d	80.30
48.50	1	04.20	1	48.13	1	81.74
49.53	1 +	04.47	1	49.05	1 +	82.10
51.42	3	04.89	1	49.53	1	84.30
52.00	1	05.60	3	50.79	1	85.17
52.32	1	06.40	2	51.10	1	86.71
54.02	1	06.96	1	52.33	1 +	87.05
54.60	1	08.95	5	52.80	2	87.40
56.37	2	10.00	1 +	53.35	1	88.27

3528.20	1 d	3567.03	1 +	3605.00	1	3630
28.66	1	68.20	1	05.30	1	3
29.12	4	68.55	1	06.27	3	33
30.70	2	69.82	1	07.05	1	33
31.88	20	71.13	1	07.40	1 +	44
32.69	1	71.82	1	07.85	1	44
33.91	1	72.81	1 +	08.25	1	44
34.60	2	73.22	1	09.42	1	44
35.13	3	73.99	4	10.98	1	44
36.21	5	74.30	4	11.34	1	44
37.81	2	74.75	1	12.09	1	44
38.70	4	76.31	3	12.90	3	44
39.50	2 +	77.02	3	13.26	2 +	44
39.80	2	78.09	3	14.23	3	44
40.85	1	78.74	1 +	14.85	1	44
42.00	1	79.02	1	15.11	1	44
42.48	3	79.30	1	15.35	1 +	55
42.98	1	79.60	1	16.24	1	55
43.84	1 +	80.20	3	16.55	1	55
44.35	3 +	82.18	2	17.38	1	55
44.47	2	84.59	2	17.85	2 +	55
45.10	1	85.20	3	18.29	2	55
45.50	1	85.89	3	18.66	1	55
45.90	1 +	86.30	2 +	19.63	1	55
46.99	4	87.51	1	20.09	1	55
47.69	1	90.22	2	20.32	2	55
48.32	2	90.82	2	20.75	1	55
48.86	2	91.55	3	21.30	1 +	55
49.37	2	91.98	2	21.70	1 +	55
50.35	10	92.30	3	22.77	1	55
51.29	1	93.30	2	22.91	1	55
51.74	3	93.85	1	24.40	4 +	55
52.15	1 +	94.35	1 + d	25.14	1	55
53.34	2	94.77	1	25.87	1	55
54.99	2	95.21	3	26.50	1 +	55
56.11	2	95.45	2 +	26.94	1	55
57.77	2	96.21	2	27.30	1	55
58.34	2	96.64	1	27.61	1 +	55
59.42	2 +	97.45	1	28.17	1	55
60.30	2	98.09	2	28.87	1	55
60.55	2 +	98.45	2 +	29.59	5	55
61.37	1	99.19	2	30.39	5	55
62.86	1	99.63	2	31.29	1	55
63.30	4	3600.49	10	32.89	2	55
63.83	3	01.06	1	33.20	2	55
64.37	2	01.55	1 +	33.91	1	55
64.70	1	02.99	2	34.40	3 + d?	55
65.85	1	03.33	1	35.00	1	55
66.24	1	04.49	1	35.40	3	55

6.15	1	3715.72	2	3759.45	1	3812.42	1
3.71	10	16.61	1	59.82	1	13.81	2
7.41	1	17.08	3	60.20	1	14.72	2
3.20	1	18.20	2 +	60.98	1 +	16.33	2
3.66	1	18.80	1	62.40	1 +	16.90	4
9.40	1 +	19.54	1	62.89	2	17.55	1
0.02	2	21.74	1	64.41	1	18.90	1
0.75	1	24.55	5	64.97	2 +	21.92	2
2.10	1	25.54	2	65.30	1 Tb?	22.75	2
2.70	1 +	26.09	1	67.75	2	25.78	2
3.19	1	26.66	1	70.34	1	28.34	2
3.54	1	27.72	2	70.78	1	28.62	1
4.54	1	28.10	1	71.21	2	29.60	2
5.01	2	28.86	1	73.18	2	29.78	2
5.93	3	29.30	1	73.45	2	31.20	2
7.07	1 +	29.7	1 + br	74.90	1 +	31.79	2
3.50	2	30.75	2 + br	77.07	1	32.49	3
0.20	1	31.25	1	77.60	1	33.00	1
0.76	1	31.53	1	78.10	1 +	34.71	1
0.51	1 +	32.28	1 +	79.39	2	36.62	4
0.76	1 +	34.15	1	79.87	1	38.01	1
1.40	1	34.48	1	80.45	1	38.84	1
1.08	1	36.06	1	81.63	1	39.97	1
1.52	2	38.48	1	82.30	1	41.03	2
4.99	10	38.72	1	83.03	1	41.48	2
5.79	2	39.48	2	83.70	2	42.12	1
3.30	1	39.97	1 +	84.09	2	43.13	2
7.09	2	40.20	1	84.80	1	44.40	2
7.45	2	41.05	1 +	85.56	3	46.50	1
3.30	10	41.30	1	86.31	5	47.16	1
7.14	1	42.00	1	87.36	3	49.53	2
7.70	2	42.40	1 +	88.59	4	50.65	1 +
7.72	4	43.17	1 +	90.12	1	53.19	3
7.17	2 +	45.19	1	92.01	2	55.04	2
7.00	1 + br, Tb?	46.48	1	93.65	1	55.80	2
7.73	1 +	48.00	8	94.48	2	59.36	1
7.00	1	50.48	2	95.54	1	62.82	1
7.55	2	51.92	2	97.07	1	64.20	1
7.72	3	52.95	1	3802.08	2	65.62	1
7.35	3	53.65	3	02.90	1	66.70	2
7.20	3	53.92	4	03.25	2	68.00	1
7.86	2	54.89	1	04.30	2	68.60	2
7.79	3	55.27	1	06.44	10	68.97	2
7.25	1	55.55	1 +	07.76	1	69.30	2
7.99	1	55.90	1	08.10	1	69.54	2
7.99	2	56.71	1	09.21	2	70.02	2
7.69	1	57.20	2	09.60	1	72.24	5
7.00	1	57.50	8	09.91	2	74.20	3
7.44	2	59.10	1	10.45	1	76.64	2

3878.10	1	3953.23	1 +	4014.02	1	4091.94
79.21	1	54.64	3	14.90	2	96.28
82.10	1	56.90	1 +	15.25	1	99.03
87.66	1	57.36	1	17.94	1	4100.07
89.15	1 Nh?	57.90	3	19.60	1 +	01.56
91.15	1 + Nh?	59.49	1	19.72	1	02.12
92.01	2 +	59.80	1	21.06	2	03.50
93.05	1	60.95	1 +	23.39	1 +	04.05
95.50	2	62.70	1 + d	23.88	1 +	05.21
97.01	1	63.95	1	24.60	2	06.65
98.70	10	64.85	1	25.81	1	06.85
3902.56	1	65.25	1	27.98	2	07.38
04.36	2	68.53	15 (Ca)	28.53	3	10.05
06.00	1 +	70.11	1 +	29.59	1 +	11.51
08.13	1 +	71.30	1	32.64	4	13.20
09.30	1	71.79	1	33.81	2	14.22
09.50	1	73.40	1 +	36.48	2	15.55
09.80	1 +	73.95	1 +	38.65	2	19.44
10.21	1 +	75.16	1	38.99	1	24.80
10.70	1 +	75.48	1 +	42.10	2	26.20
11.81	1	77.53	1	46.17	4	28.40
12.32	1 +	77.96	1	47.95	1 +	29.20
13.03	1 +	78.72	10	48.51	1	29.50
14.15	2	79.60	2	49.00	1 +	30.50
15.01	3	82.09	5	50.72	5	31.20
15.72	3	83.81	4	53.51	1 +	32.20
17.49	1	84.38	3	55.30	3	33.00
18.15	1 +	84.84	1	55.90	1 +	33.50
18.70	1	87.23	1	57.56	2	33.90
19.30	1 + br	89.95	1	60.74	1	34.80
19.57	1 +	90.50	1	61.25	1	37.40
21.6	1 + br	90.92	1	65.29	1 +	39.60
23.49	3	91.49	3	66.51	1	40.90
24.60	1	92.05	1	68.15	1 +	41.60
29.85	1 +	95.90	1	68.67	1 +	43.20
30.83	1 +	96.18	1	69.90	1 + br	46.20
31.67	3	96.88	4	70.25	1 + br	47.20
32.32	2	98.80	1	72.80	1	52.00
36.19	1	4000.03	1	73.30	5	54.00
36.41	1 +	00.64	15	73.84	1 +	54.60
36.84	1	02.35	1	74.16	1	55.90
37.70	1 +	04.47	1	77.14	1	56.80
38.20	2 + d	06.01	1	78.15	10	57.10
39.79	1 +	06.26	1	81.99	1	58.80
40.90	1 +	07.95	1	85.35	1 +	58.80
42.64	3	10.25	2	85.52	1	58.80
44.82	10	11.47	3	87.36	2	59.80
47.06	2	12.00	1	87.98	1	60.80
50.51	3	13.00	1	91.70	2	63.80

8	1 + br, d	4273.30	2 +	4431.15	2	4559.80	1
53	1	74.12	1 +	34.49	1 +	65.30	2
94	1 +	78.86	1	36.77	1	67.29	1
11	4	86.00	1 +	44.75	1	73.18	1 +
45	1 +	95.14	5	45.18	1	74.08	2
10	1 +	95.70	1 +	48.34	1	76.79	1
05	1 +	4308.79	4	49.32	2	77.99	3
00	1	14.04	2	49.89	4	81.62	1
75	1	22.68	1 +	55.79	2	83.23	1
50	1 +	25.27	2	56.54	2	84.97	1 +
03	2	28.1	1 + br	60.05	1 +	86.20	1 + br
55	2	29.08	1	61.30	1 +	86.40	1
87	3	30.02	1 +	68.07	1	86.85	1
99	4	39.80	3	68.31	2	88.11	2
10	1	46.51	2	71.31	1	89.53	5
81	3	47.90	2 +	76.81	1	92.00	2
01	4	49.25	1 +	77.69	1	95.33	1
19	2	54.30	1 +	80.85	1 +	96.97	1
51	2	55.45	1 +	82.53	1	97.67	1
42	2	58.61	2	84.58	1 +	4600.05	1 +
23	1	60.35	2	86.40	1	00.90	1
85	1	61.50	2	88.75	1	09.25	1 +
71	2	62.44	1	90.65	1	11.90	1 +
41	1	63.10	1	92.32	1 +	12.47	4
90	5	64.35	3 d	93.25	1 +	13.65	1 +
36	3	66.25	2	94.30	1 +	15.00	1
32	3	66.90	1	98.68	1	15.75	2
26	3	74.41	2	4500.11	1	17.45	2
29	3	74.93	2	01.45	1	20.21	2
33	3	75.50	2	02.72	1	20.59	1
20	1	78.50	1	03.41	2	22.56	1
4	1 +	80.40	1	06.25	1	24.30	1 +
70	1	84.48	1	07.11	2	24.60	1 +
60	1 +	85.45	2	15.21	1	28.29	2
04	2	89.96	1	15.73	1	29.25	1 +
55	1 +	95.14	2	17.13	2	31.70	1
06	1 +	96.25	1	18.70	2	35.53	1
8	2	4400.25	1	19.99	2	36.40	1 +
1	2	01.81	1	27.09	1	37.30	1 +
0	1 +	05.79	1 +	27.80	1	37.78	1
5	1 +	07.35	1	27.95	2	39.00	2
9	3	08.26	2 +	29.97	1 +	43.0	2 + br
7	1 +	09.59	3	38.90	1	47.50	1 +
5	1 +	11.55	1	41.85	3	49.62	2 +
8	1 +	18.24	1	45.51	2	50.35	1
0	1 +	19.09	1 +	51.05	1	51.73	1
5	1 +	20.50	1	56.64	2	52.80	1
1	1 +	21.84	2	57.70	1 +	53.60	1
2	1 +	27.01	1	58.31	1	54.91	1